

6-30-2000

Agricultural Research Division 114th Annual Report 2000

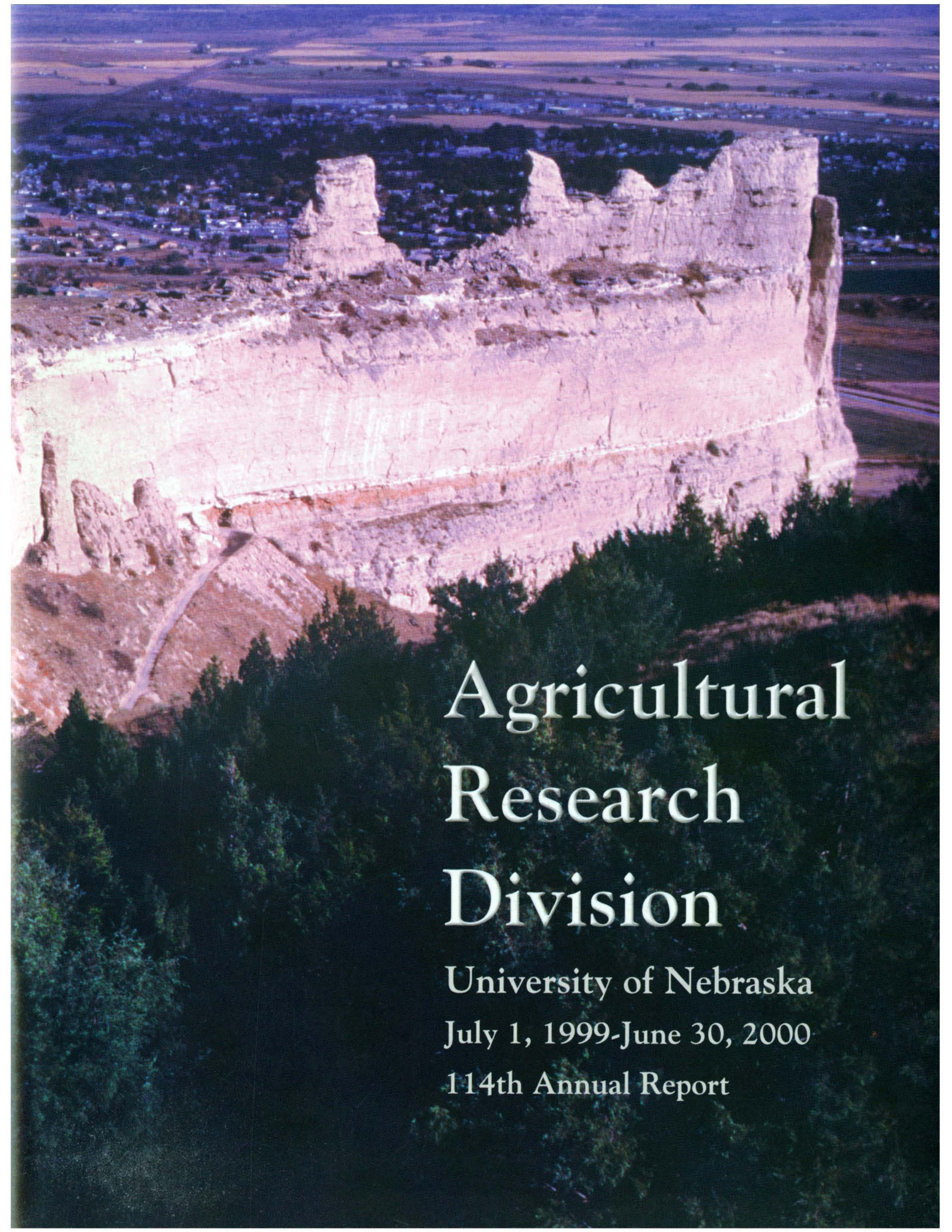
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Agricultural Research Division

University of Nebraska
July 1, 1999-June 30, 2000
114th Annual Report

On the cover: The Scotts Bluff National Monument, a prominent, natural landmark, is a memorial to the emigrants who moved America westward on the historic Oregon, California and Mormon trails. The massive promontory, or bluff, rises 800 feet above the North Platte River, opposite the city of Scottsbluff. Named for Hiram Scott, a fur trapper, the 3,000-acre site was designated a national monument in 1919. Photography by Brett Hampton

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Our Mission

The mission of the Agricultural Research Division in the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln is to conduct problem-solving and fundamental research that addresses priority issues facing Nebraska's agricultural and food industries; provides the knowledge base essential for managing our natural resources; promotes family well-being and community development; and educates future scientists through hands-on experiences.

Foreword



Darrell W. Nelson

It is a pleasure to provide you with a copy of the 114th Annual Report of the University of Nebraska Agricultural Research Division (ARD). This report is our opportunity to inform you about our research programs and accomplishments and to allow us to assess the progress and effectiveness of our collective efforts to develop new knowledge. After examining this report, we hope that you will agree with our assessment that ARD research has provided new technology and knowledge for Nebraskans that will improve the profitability of their enterprises, enhance environmental quality, and improve their quality of life.

This report provides some highlights of research accomplishments, a listing of scientists and research associates, awards and honors received by our faculty and graduate students, outputs from our research projects, and the ARD financial report for the period July 1, 1999 to June 30, 2000. This report was compiled in compliance with the intent of the law of the State of Nebraska that established the Nebraska Agricultural Experiment Station on March 31, 1887.

The ARD is the primary research component of the Institute of Agriculture and Natural Resources. Outlined in the Research Highlights section are some of the significant accomplishments of our faculty during the past few years. Included among these accomplishments are: (i) identifying a yield drop associated with inserting the Roundup Ready gene in soybean varieties; (ii) estimating the economic impacts of large swine operations on rural communities; (iii) evaluating air chilling of poultry carcasses as a means of reducing the incidence of pathogens; (iv) characterizing muscle tissue to improve the value of beef chuck and round; (v) developing technologies to return CRP land to crop production; (vi) measuring nutrient intake by teenage girls concerned about their weight; and (vii) evaluating techniques to monitor the development of resistance to Bt toxin among European corn borer populations.

We continue to be excited about our research programs and the scientists who work diligently to solve today's problems and help provide the knowledge necessary to address the issues that will arise in the future. The ARD was created to serve the people of Nebraska and the nation. We welcome your input on our current research efforts and on your needs for research information.

Darrell W. Nelson
Dean and Director
Agricultural Research Division

Research Highlights

The Agricultural Research Division is the only public entity in Nebraska charged with conducting agricultural research. It is part of a national network of state agricultural experiment stations located in Land Grant Universities across the United States. In 1973, the state legislature passed LB 149 which established the Institute of Agriculture and Natural Resources. The Agricultural Research Division was created as one of IANR's six divisions. The state legislation also expanded the federal mandate for agricultural research conducted by the Nebraska experiment station to include research in natural resources, human resources and family sciences. The ARD research portfolio represents a scientific investment in Nebraska's future. ARD research not only solves today's problems, it also defines tomorrow's opportunities.

IANR-developed test reveals differences in *E. coli* populations

Using a new genetic fingerprinting technique they developed, IANR food scientists have found surprising differences in populations of the potentially deadly *E. coli* 0157:H7 bacteria.

The Nebraska team found two genetically distinct *E. coli* 0157:H7 populations in cattle — one that causes human food poisoning and another that is seldom found in people with gastrointestinal illness. This research suggests that a significant portion of 0157:H7 strains in cattle — as much as two-thirds — are either non-virulent, meaning they are incapable of causing disease, or they're not easily transmitted to people.

This could be good news for public health and for cattle producers.

The genetic technique developed by the team is called octamer-based genome scanning (OBGS). It allows researchers to pinpoint where genetic differences exist on

E. coli's DNA and offers a means for rapidly cloning and identifying the genes at those DNA sites. Using OBGS, researchers are able to gain a clearer picture of the genetic differences of *E. coli* 0157:H7 populations — relationships that previously have not been well-understood.

The OBGS method has practical applications in the development of a more sensitive test of *E. coli* 0157:H7 isolates. Researchers are using OBGS to pinpoint the exact genetic differences between populations so a much simpler test that can discriminate between the two can be developed. Such a test would make extensive testing, such as in feedlot populations, much easier.

Lab monitoring corn borers' susceptibility to Bt

Using tests he developed, an IANR entomologist moni-

tors European corn borers nationwide for potential resistance to Bt, the natural insecticide.

His lab tests corn borer populations from U.S. corn growing areas annually for changes in Bt susceptibility. Bt corn's long-term effectiveness depends on preventing this multi-million dollar corn pest from becoming resistant to Bt. Detecting potential changes early is critical to nationwide Bt resistance management efforts.

Annual testing should provide early warning if resistance begins to develop in certain corn borer populations. The goal is to spot changes before resistance becomes widespread so steps can be taken to preserve Bt's effectiveness.

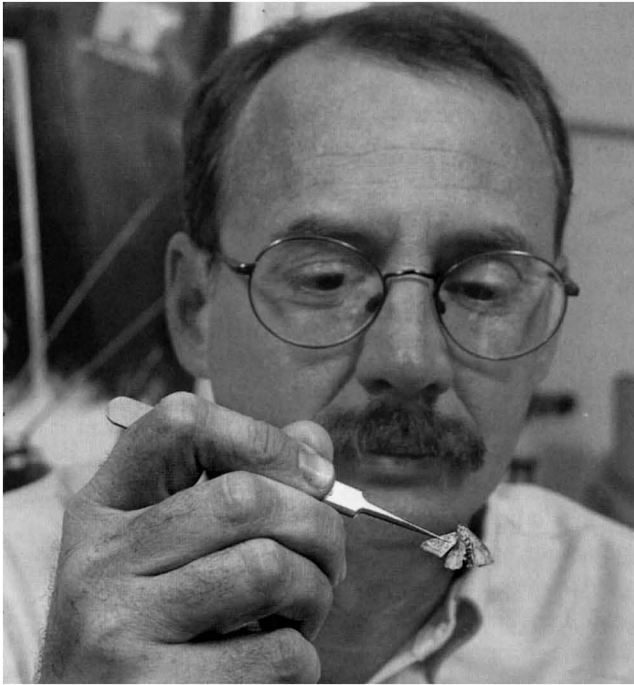
So far, so good, tests show. While there are limits to the tests' sensitivity, researchers saw no susceptibility changes in the first five years Bt corn was in use. Corn borers nationwide remained susceptible to Bt toxins.

IANR entomologists began working with seed companies in 1993, before Bt corn was commercialized, to establish baseline information on corn borer susceptibility to Bt across North America. Baseline information allows them to detect potential susceptibility changes as Bt plantings expand.

This lab is responsible for assessing and keeping records on corn borer Bt susceptibility nationwide. This research is funded by seed companies, which must provide annual susceptibility measurements as part of federal requirements for selling Bt seed corn.



Food Microbiologist Andy Benson (left) and graduate student Jaehyoung Kim examine printed images of *E. coli* 0157:H7 fragments. Benson's research team developed a new genetic fingerprinting technique that allows them to see *E. coli*'s genetic differences more clearly than ever before.



Entomologist Tom Hunt inspects a European corn borer moth collected in a light trap. His research shows female moths are less likely to leave irrigated than dryland cornfields to mate. These findings aid Bt corn resistance management strategies.

Tracking movements of moths aids Bt management

Understanding European corn borer moth movements under different field conditions should help reduce the risk of this major corn pest developing resistance to Bt corn.

IANR entomologists studied European corn borer moth movements in irrigated and dryland cornfields for three years. Their findings provide a clearer understanding of moth movements, especially in irrigated corn. Bt corn is genetically engineered to produce a natural insecticide toxic to corn borers and other caterpillars.

Previously, it generally was thought that moths typically leave fields before mating. Most earlier moth dispersal studies involved dryland corn

in Iowa. IANR researchers needed to know what happens in Nebraska's large irrigated fields.

They found some surprises. Results showed that many female moths stay close to home, especially in damp, humid irrigated fields. This research also showed that moth movements differ in irrigated and nonirrigated fields, that moth dispersal is highly variable and that field conditions significantly influence that movement.

This information about moth movements under different field conditions is aiding decisions about where to locate non-Bt corn plots that provide European corn borer refuges amid Bt corn. Refuges are among strategies mandated to prevent or slow development of Bt resistance among corn borers. Seed company recommendations for refuge planting

distances, which every farmer who plants Bt corn must follow, are based partly on this Nebraska research.

Scientists are using the results to explore ways to develop more accurate models to predict corn borer movements and mating patterns. They continue studying moth movements.

Studies probe turf, forage grass seed production

Turf and forage grass seed is being produced on a small but increasing number of acres in Nebraska's Panhandle.

The region's climate is well-suited to grass seed production, which offers a new cropping option to help the region's farmers diversify their operations. IANR researchers and Cooperative Extension specialists are providing research results and information producers need to grow grass seed in the Panhandle.

NU studies have provided information about factors such as seed planting dates, the best grass and forage varieties, fertility and water requirements and production practices. Research honed management procedures for producing excellent yields of high-quality turf and forage grass seed under irrigation. These findings have been shared with interested growers during field days and educational sessions.

About 1,500 acres of grass seed were harvested in the Panhandle in 1999, up significantly from about 300 acres three years earlier. It's estimated that grass seed production now contributes about \$1

million annually to the region's economy.

Many girls' diets barely sufficient nutritionally

Thin is in. Media messages and social pressure to be thin are so strong that some girls cut nutritional corners to meet unrealistic weight goals, IANR research shows. Striving for an ideal body shape prompts them to eat diets barely sufficient for growth and development.

An NU nutritionist and graduate student examined diets of 230 Nebraska girls ages 8-17. They found girls as young as age 8 thought about dieting. From age 11 up, girls studied were already dieting and researchers found their diets low in key nutrients. Dieters ate fewer calories and consumed significantly less calcium, other minerals and vitamin B-6 than non-dieters. Participants averaged about 850 milligrams of calcium daily, far less than the recommended 1,300 milligrams for girls 9-18, putting them at risk for osteoporosis later in life.

Researchers also examined body image and found most participants preferred ideal body shapes thinner than their actual figures, likely reflecting "thinner is better" messages.

This NU College of Human Resources and Family Sciences study found that girls' diets tended to become less adequate with age. Researchers recommend educating girls about nutrition, healthy weight goals and realistic body images before age 8 to combat messages that risk their long-term health.



Molecular Geneticist Kulvinder Gill (left) and Wheat Breeder Steve Baenziger examine patterns of DNA from different wheat lines. They head a team of IANR scientists studying a major gene responsible for yield in wheat.

Zeroing in on major gene responsible for wheat yield

Yield is a pivotal crop trait, yet little is known about which genes influence yield and how they function.

An IANR agronomy team is on the trail of some answers. They're zeroing in on what they believe is a major gene responsible for yield in wheat. They've already narrowed the gene's location to a small segment on the tip of one of wheat's 21 chromosomes.

Their research suggests a single gene is responsible for boosting yields 14 percent to 16 percent. Their findings so far are particularly significant because yield is extremely complex and scientists long have thought it's unlikely that a single gene would have a major yield influence.

In the early 1990s, an IANR wheat breeder identified the chromosome at the heart of the current research using unique wheat lines developed at NU in the 1950s. Since that

discovery, IANR scientists have scrutinized this chromosome. They've narrowed their search, identified molecular markers associated with yield and are using molecular biology tools to pinpoint the gene's location.

While it's complex, slow work, the team expects to find and clone the yield gene. This functional genomics research offers the chance to decipher the genetic mechanisms responsible for yield. In the long-run, the gene and the knowledge gleaned from this research eventually could be incorporated into NU's wheat breeding program.

Reduction of dietary phosphorous economic, environmental plus

Reducing dietary phosphorous in feedlot cattle makes economic and environmental sense.

Two years of research by IANR animal scientists showed feeder cattle get more than

enough phosphorous in their diets without supplements and can perform well on less. While excess phosphorous doesn't hurt or help cattle, it's an unnecessary expense and an environmental concern if excess phosphorous reaches lakes or streams.

IANR animal scientists studied the effects of reducing dietary phosphorous on feedlot calf and yearling performance and on the amount of phosphorous in manure.

They fed about 60 percent less phosphorous than is typically fed in the cattle industry and could not create a diet low enough to see any effect on the cattle.

Feeding only enough phosphorous to meet animal needs meant less wound up in manure. Reducing dietary phosphorous 34 percent for calves and 44 percent for yearlings reduced phosphorous in manure 38 percent and 59 percent, respectively.

This clearly shows supplemental phosphorous is an unnecessary expense and that excess phosphorous winds up in manure. When manure is applied to land as fertilizer, excess phosphorous can wash off fields and pollute surface water.

Industry thinking about dietary phosphorous is changing, partly because of these findings. Feedlot nutritionists now are aware of phosphorous overfeeding and most Nebraska feedlots no longer buy this supplement. Instead of worrying about feeding enough phosphorous, feeders and nutritionists are looking for ways to feed less.

Reducing phosphorous con-

tent in feed so cattle get only what they need and as little as possible gets in manure is the goal.

Rust-resistant pinto providing economic benefits

Nebraska is among the nation's top dry edible bean producing states. During the early 1990s, rust epidemics severely damaged pinto bean crops in southwestern Nebraska. Facing yield losses and costly fungicide treatments, producers asked the university for help.

IANR's dry bean breeding team developed the first pinto bean with rust resistance, which included resistance to three common bacterial diseases. NU released the high-yielding pinto, called Chase, at the Nebraska Dry Bean Growers Association's request. It became available in 1995 as an interim variety to address an urgent situation.

Other rust-resistant varieties now are available, but Chase was the only one when it was released. The multiple disease resistance meant farmers didn't need to use fungicides on fields planted to Chase, and it yielded 7 percent to 10 percent more than the average of other pintos in 1990-98 trials.

While color concerns have limited Chase's use, an IANR agricultural economist's analysis found this variety is providing economic benefits. This analysis found that Chase's superior yields and disease resistance are generating at least \$5 million in total direct

economic benefits for growers in Nebraska and surrounding bean growing regions during its projected 1995-2002 life span. That's based on a \$25-\$35 per acre yield benefit and a \$5 per acre production cost savings.

Wet byproduct feeds research has big payoff

Wet byproducts from Nebraska's growing ethanol and grain processing industry have become a major cattle feed source in the past decade and now provide millions of dollars in economic benefit annually.

An IANR agricultural economist's analysis showed that feeding byproducts wet instead of drying them provided cumulative net economic benefits of about \$212 million in Nebraska from 1992 through 1999. Annual net economic benefits grew from \$1 million in 1992 to an average of \$42 million in recent years as new processing plants opened and more feedlots fed wet byproducts. Nebraska feedlots fed nearly 6 million tons (dry matter basis) of wet byproduct feeds from 1992 to 1999.

These payoffs are rooted partly in NU agricultural research. Pioneering studies by IANR animal scientists in the 1980s and 1990s proved the feasibility, benefits and economic advantages of feeding wet gluten feed, wet distillers grains and steep liquor to cattle directly instead of drying and shipping them to dried feed markets. Processors traditionally had dried byproducts

but IANR scientists found drying reduced their nutritional value. Feeding byproducts wet saves drying costs for processors and provides an economical cattle feed.

Researchers worked closely with ethanol processors and cattle producers to share their findings. Findings influenced decisions to build new plants in Nebraska designed to market wet byproducts. Nebraska's ethanol production capacity grew more than any other state's during the 1990s. Only one of the state's seven wet and dry milling plants now dries byproducts. The rest sell byproducts wet.

Team devises simple way to test pens of cattle for *E. coli*

Capitalizing on cattle's habit of chewing and licking, IANR researchers have devised a simple, effective, economical way to test pens of cattle for *E. coli* 0157:H7.

After experimenting with some fancy sampling techniques, they found that simply hanging pieces of rope around a pen in the evening works best. Within two hours, over half the cattle — plenty for a representative sample — chew or lick the ropes, leaving traces of the organisms they're carrying. Ropes are removed and lab tests determine *E. coli*'s prevalence.

Researchers knew that devising an economical way to test whole pens of cattle without testing individual animals was important for research and for on-farm food safety efforts. Cattle are fed and marketed as

pens so looking at them as a group makes sense.

Researchers are refining the test and using it in *E. coli* research. Ultimately, they want to make it a practical tool producers could use to match *E. coli* intervention strategies to specific pens of cattle.

IANR studies showed rope tests are more sensitive than manure samples for detecting *E. coli* prevalence in pens. Manure samples accurately identify only high prevalence pens where more than 40 percent of cattle are shedding *E. coli*. Rope tests detect such pens plus medium prevalence pens where at least 16 percent of cattle are shedding. If no *E. coli* is recovered, pens are considered low prevalence.

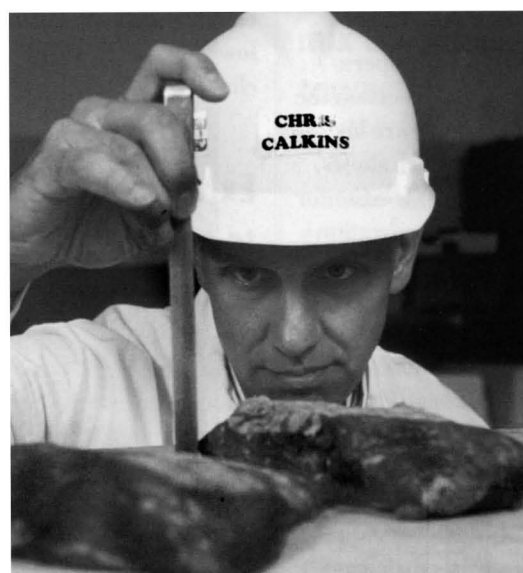
The test is helping researchers compare conditions in high, medium and low prevalence pens. They want to identify potential risk factors such as time on feed, temperature and pen conditions.

Meat scientists find beef chuck, round are undervalued

Much of the meat in the beef chuck and round deserves a better fate than being ground and slapped between two hamburger buns, an IANR study shows.

The two-year study extensively profiled the muscles that make up the beef chuck and round, and was the largest study of its kind. Results show that many of the muscles that traditionally are ground should have a higher-value use. This research was motivated by a 1997 cattle industry report that found chuck and round values had decreased more than 20 percent — a huge loss considering that these cuts make up the majority of the weight of the beef carcass.

Collaborating with the University of Florida, IANR researchers extensively



Meat Scientist Chris Calkins measures the thickness of a cut of beef round. In the largest study of its kind, Calkins and other researchers profiled beef round and chuck muscles.

profiled more than 5,500 muscles. The Nebraska meat scientists analyzed muscles for nutritional and biochemical traits important to value-added processing. They performed more than 25,000 different tests, including measurements of color, fat and moisture content, pH, water-holding capacity and amount of connective tissue.

Their findings: great variation exists in these muscles, and many have a higher quality and warrant a better use than traditionally given.

Results have been compiled in a user-friendly booklet, published by the National Cattlemen's Beef Association. The Cattlemen's Beef Board funded the study. The team also is developing an educational CD-Rom. This definitive information can be used to develop new value-added products that will benefit producers and consumers.

Study finds mixed effects from large swine operations

Large-scale swine operations have mixed effects on the counties where they are located, IANR research shows.

Researchers in NU's Center for Applied Rural Innovation studied large swine operations' social and economic impacts. They reviewed 15 years of pork production patterns in Nebraska and five other states. They defined large operations as those with 1,000 or more head.

This study compared quality-of-life indicators such as income, taxes, population and jobs in counties with stable

pork production to similar counties where production significantly expanded. Analyzing 15 years of information provided a longer-term perspective on swine operations' growth patterns and socio-economic impacts on counties.

They found that counties with big swine operations lost more population and had higher property taxes than stable production counties. Retail sales remained competitive in large-scale swine operation counties, while per capita incomes increased and poverty decreased faster than in stable production counties. All counties studied lost both farm jobs and swine operations, but counties with large swine operations lost farm jobs and swine operations more slowly.

Researchers found the pace of change in Nebraska's swine industry has been slower and the scale of operations smaller than in the other states studied. Between 1988 and 1996, Missouri lost nearly 60 percent of swine operations, the study's highest percentage change, while Nebraska was lowest with a 36 percent decline.

Exploring ways to take safer chicken to market

Chickens chilled with cool air may be less likely to be contaminated with disease-causing organisms and last longer in stores than broilers cooled in water, IANR research indicates.

This research by an IANR food and veterinary science team was conducted at MBA Poultry in Tecumseh, Neb., which opened in 1998 as the United States' only federally inspected air-chilled poultry plant. Scientists compared MBA's air-chilling processing with the immersion-chilling used at other U.S. plants. While MBA's closing and bankruptcy sale in 2000 delayed research, the team hopes to continue working with the plant's new owners.

A critical processing step, chilling lowers carcass temperature to inhibit bacterial growth. Air chilling, during which broilers are chilled individually on an assembly line with a draft of cold air, is widely used in Europe. U.S. processors chill broilers in tanks of flowing cold water. It's thought the risk of cross-contamination is greater with immersion chilling since broilers come into contact with each other. Immersion chilling also leads to water retention in the broilers. Emerging USDA labeling regulations would require poultry processors to specify how much water they contain.

The IANR team compared MBA's air-chilled broilers with those from an undisclosed immersion-chilling plant. Both sets had roughly similar counts of non-disease-causing bacteria. However, air-chilled broilers had less Salmonella and Campylobacter, bacteria that can cause food-borne illness. The air-chilled chickens also had significantly fewer psychrotrophs, bacteria that grow at refrigeration temperatures and cause spoilage.

These preliminary findings are the basis for broader farm-to-table research, including study of chicken farms, to take safer chicken to market by pinpointing factors throughout the production process that influence safety. This research could yield new guidelines for handling broilers.

Unlocking genetic keys to latency of herpes viruses

An IANR veterinary scientist's genetics research is on the leading edge of breakthrough theories about how herpes viruses cause disease and perpetuate themselves in people and cattle. These theories offer hope for new herpes vaccines and treatments.

He focuses on two viruses, Bovine Herpes Virus 1 (BHV-1) and the closely-related human herpes simplex virus type 1 (HSV-1). Both cause infection by traveling to neurons, specialized cells that transmit messages to the brain. Viruses replicate by commandeering the genetic machinery of the host cells, usually killing the cell and causing disease symptoms. But when BHV-1 or HSV-1 infect a neuron, the virus often shuts off, entering a latent state and allowing the neuron to survive.

How and why herpes viruses become latent are questions this research seeks to answer. Latency helps the virus survive in a person or animal by keeping infected host cells alive and allowing the virus to periodically reactivate and infect other host cells. If

researchers could prevent a virus from becoming latent, they could develop better vaccines and slow or stop virus transmission.

The IANR scientist's early work included discovery of a gene that encodes a latency-related protein. More recently, he was the first to demonstrate that the latency-related protein inhibits programmed cell death and may promote latency. The latency-related gene acts like a switch. When it's on, the virus produces the protein, cell death is inhibited, and the host cell and virus survive. Finding a way to switch off the gene could be a way to treat viral diseases.

Fore! Team seeks environmentally friendlier greens

Faster, smoother, more consistent putting greens with less fertilizer? It sounds like a golf course superintendent's dream, but it may become a reality, according to preliminary results from a five-year NU study.

In search of better putting greens with less environmental impact, IANR turfgrass scientists built four sets of experimental greens at NU's John Seaton Anderson Turfgrass Research Facility near Mead. Each set consisted of a control green built with the commonly-used, U.S. Golf Association-sanctioned sand/peat root zone mixture; the other green included 5 percent silty clay loam soil in the mix.

Researchers then applied two different nutrient treat-

ments to the greens for the crucial grow-in process. One preplanting treatment used 3 pounds of nitrogen, 1.5 pounds of phosphorous and 2 pounds of potassium per thousand square feet. The second, accelerated method used nutrient concentrations about double those rates.

Greens grown with the soil mixture have shown no negative effects, belying the conventional wisdom that soil particles tend to block water infiltration and make the putting surface too hard. These greens also have bounced back more quickly from injury and aeration.

Greens given the higher-nutrient, accelerated grow-in treatment did grow in more quickly, but were more susceptible to disease and developed a shallower root system, which can cause long-term problems.

Project explores Nebraska's carbon storage potential

Increasing atmospheric concentrations of carbon dioxide (CO₂), a major greenhouse gas, are raising concerns about potential global warming.

Reducing fossil fuel use is the long-term solution, but storing, or sequestering, carbon in soil might buy time for broader efforts to cut fuel use. Farmers eventually might be paid for storing extra carbon in their soils.

Carbon cycles through soil naturally. Plants take in CO₂ for photosynthesis and carbon mostly enters soil when plants die. Eventually it recycles back into the air. The challenge is finding ways to store more in soil. Many farming practices

that improve soil quality and boost crop yields enhance carbon sequestration.

IANR scientists from agronomy and the School of Natural Resource Sciences are heading interdisciplinary research to understand the carbon sequestration potential of Nebraska's highly productive, irrigated farms. They want to identify factors controlling carbon sequestration in irrigated and dryland crop systems and develop cost-effective ways to increase it.

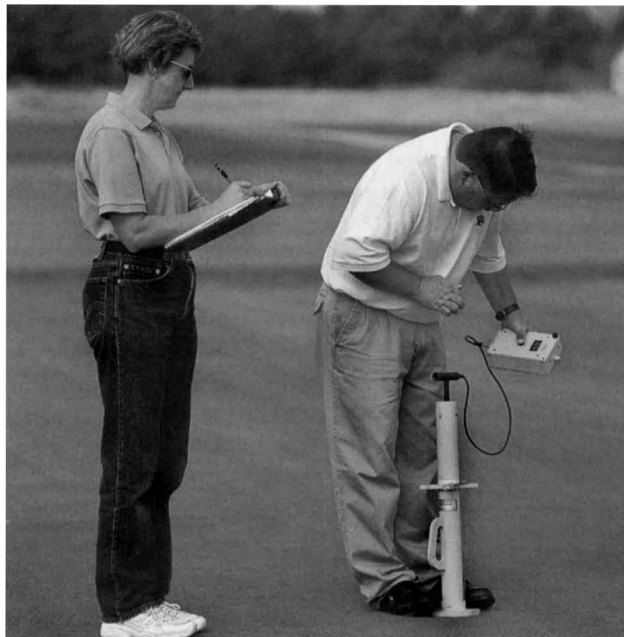
They're launching a comprehensive project measuring how much CO₂ enters and leaves fields daily under different conditions, thanks to major U.S. Department of Energy grants. They're also testing existing simulation models that predict carbon sequestration rates based on yields, management and other factors to determine which work best under Nebraska's irrigated conditions.

Renovating housing mix boosts small towns' vitality

More and more rural communities and counties have declining populations and an increasing proportion of older residents.

An IANR consumer scientist studied how an aging population affects the vitality of rural communities and the implications for housing policy.

She and a colleague analyzed 1990 and 1980 U.S. Census Bureau data from 834 rural counties in the 12-state North Central Region, which



Turfgrass Scientist Roch Gaussoin measures the hardness of this golf green as Research Technologist Milda Vaitkus records data. IANR turf scientists are studying how different golf green grow-in procedures affect surface hardness and uniformity, key elements of a good golf course.

includes Nebraska.

The researchers found that 71 percent of these counties had a decreasing population and an increasing proportion of residents age 65 and older, indicating that younger people were moving away. Twenty-four percent of the counties had an increasing population and an increasing proportion of elderly, indicating retirees were enticed to move to the county. Two percent of the counties had a decreasing population and a decreasing number of elderly.

Communities with declining and aging populations often have a smaller proportion of residents in the labor force, less per capita earnings, lower county populations, and residents, on average, have less education.

In this study, as the proportion of elderly increased, income per capita was slightly higher and the proportion of residents below the poverty level tended to decrease. However, rural communities often have single family homes and nursing homes but lack housing that supports semi-independent living. They also often have older housing lacking the amenities considered standard by younger families.

The NU College of Human Resources and Family Sciences researchers found that rural communities appear to benefit from having a diversity of residents, housing and employment, but they will have to be creative to provide the appropriate housing mix.

IANR studies show Roundup Ready soybeans yield less

Roundup Ready soybeans simplify weed control, but they yield somewhat less than conventional soybeans, IANR research found.

IANR studies in 1998 and 1999 found that Roundup Ready soybeans yield 6 percent less than their closest conventional relatives, called sister lines, and 11 percent less than high-yielding conventional varieties. Roundup Ready soybeans contain a gene that prevents damage from Roundup Ultra, the most popular non-selective, glyphosate-based herbicide.

Researchers studied two potential causes for lower yields in Roundup Ready soybeans — spraying with Roundup or the gene insertion process. Their first study showed herbicide spraying had no effect. A second study focused on effects of the gene insertion process.

In dryland and irrigated field studies in weed-free situations at four locations, they compared five Roundup Ready cultivars, their sister lines and high-yielding conventional cultivars. They controlled weeds with conventional herbicides and by hand. Roundup wasn't used so scientists could compare yields without that variable complicating results.

Researchers found that Roundup Ready soybeans' lower yields stem partly from the gene insertion process. The types of soybeans into which the gene is inserted account for the rest of the yield penalty. Today's Roundup Ready varieties probably were developed from higher-yielding parents.

Researchers said yield differences don't seem to worry farmers, who continue planting Roundup Ready soybeans because of the system's simple, effective weed control. The Roundup Ready system may be more profitable than conventional soybean systems if weeds can't be controlled using conventional means, they said.

Improving switchgrass for viable biomass fuel

Switchgrass, a Nebraska native prairie grass, could become a major source for renewable fuel. Research at NU aims to help make this possibility a reality.

The U.S. Department of Energy (DOE) has selected switchgrass as its top crop candidate for biomass fuel conversion. Biomass fuels are produced by extracting the sugars from plants and converting them to a renewable liquid fuel — ethanol. DOE is developing the conversion technology and aims to have it in place by 2010.

A USDA-Agricultural Research Service plant breeder at NU is developing high-yielding, high-performance switchgrass varieties ready for full-scale biomass production when the technology is ready. He collaborates with several IANR agronomists on everything from switchgrass genetics to the best herbicides for switchgrass establishment. Thanks to his early research and foresight, NU is a leader in developing switchgrass into a viable biomass fuel source.

His extensive collection of Midwestern switchgrass germplasm made NU an early player in this effort. A DOE grant to evaluate germplasm for yield potential and stability grew into a comprehensive program to develop improved cultivars and management practices to maximize biomass.

Switchgrass is especially promising because it can grow on marginal land and is high-yielding and environmentally friendly. Early NU trials yielded 6 tons per acre in a single cutting, a figure that could easily increase 30 percent with hybrid varieties. A USDA study predicts switchgrass could bring \$40 per dry ton as a bioenergy crop, increasing Nebraska's annual net farm income by \$83 million.

a few more glimpses at ARD research ...

- A five-year IANR study on how best to return Conservation Reserve Program acres to crop production helped Nebraska landowners recrop these acres as CRP contracts expired. The CRP to Crops project explored residue management, weed control, fertilizer and tillage strategies for corn, soybeans and grain sorghum at a site near NU's Haskell Agricultural Lab in northeast Nebraska. Tours let producers see firsthand which management options worked best. Researchers shared findings fresh from the field to fill the urgent need for CRP conversion information. This research concluded in 1999.
- Most Bt corn pollen falls in or near cornfields before most monarch butterfly caterpillars emerge, IANR research shows. First-year results of an entomology study of five Bt cornfields found most pollen fell within 5.5 yards of the field, with the highest pollen counts within the first yard. None was found on milkweed more than 44 yards from fields. This study also found that while milkweed often grows near cornfields, there's little threat to the monarch caterpillars that feed on milkweed because 95 percent of corn pollen is shed before caterpillars develop.
- Three new NU-developed hard red winter wheat varieties recently became available for farmers. The new wheats - Culver, Millennium and Cougar - all were jointly released by NU and USDA's Agricultural Research Service. IANR and USDA scientists collaborate on Nebraska's wheat breeding and development program. Culver and Millennium are high-yielding varieties. Culver is best adapted to southwestern and south central Nebraska; Millennium grows best in southwestern and western Nebraska. Cougar works best for situations where planting to moisture is needed or where lodging resistance is particularly important. It was released primarily because of exceptional straw strength.
- NU animal scientists are helping to test a promising new procedure for sorting male from female sperm cells for livestock production. Colorado State University developed the sperm-sorting technique. Researchers at NU's West Central Research and Extension Center near North Platte tested the procedure by artificially inseminating yearly heifers and later using ultrasound to check fetuses' sex. First-year results of the IANR study looked promising. If second-year findings are equally positive, sorted semen for cattle soon could become commercially available.
- A decline in retail sales in many rural Nebraska communities accelerated during the 1990s regardless of the ag economy's strength. An IANR agricultural economist and a graduate student tracked Nebraska retail sales trends from 1970 to 1998. They found the state's metro areas pulled sales away from regional trade centers and local main streets in droves during the 1990s. By 1998 the state's six metro counties claimed 69 percent of Nebraska's taxable retail sales, up from 49 percent in 1980. Taxable sales percentages in non-metro counties dropped from about 51 percent in 1980 to 37 percent in 1998.
- Legacy, the latest improved turf-type buffalograss from IANR's turf breeding team, became commercially available in 2000. The newcomer boosts better color than earlier NU turf buffalograss releases and is better adapted to grow in the northern United States. Todd Valley Farms of Mead grows and sells the new cultivar under a university licensing agreement. Like IANR's other improved buffalograsses, Legacy needs half the water and far less mowing, fertilizer and chemicals than most other turfgrasses.
- Purple-colored waste lagoons are a welcome sight for livestock producers. They have less odor than conventional grayish lagoons because their naturally occurring purple sulfur bacteria feed on odor-causing organic compounds. IANR biological systems engineers studied ways to manage and encourage purple sulfur bacteria growth. This research provides insights about what factors determine whether lagoons turn purple. Findings should help producers encourage these invisible purple odor-eaters.
- Proper manure management is an economic and environmental concern for Nebraska's livestock industry, which generates about 27 million tons of animal waste annually. University of Nebraska agronomists are studying how to manage manure applications, timing and tillage practices to make the most of its crop nutrients and protect the environment. They're studying runoff and a variety of other agronomic factors. First-year results showed manure provides a temporary protective cover that reduces runoff from fields during the critical April-to-July period when soil is most vulnerable to heavy runoff. Manure application timing and tillage strongly influence the degree of runoff protection.

Faculty Awards and Recognitions

The impact and quality of ARD research can be assessed in many ways. One measure of excellence is the recognition researchers' work receives from peers and from those who benefit from the research. A number of ARD faculty members are widely recognized as leaders in their disciplines, and a number received international, national, regional and/or state honors.

Many ARD faculty also serve as officers or directors in their professional societies and state, regional, national and international organizations. Some are editors and associate editors of professional journals. We applaud their efforts in furthering the knowledge and professionalism of their disciplines.

Agricultural Economics

Sam Cordes received the Founder's Award from the Rural Policy Research Institute.

Agronomy

P. Stephen Baenziger received the Distinguished Service Award from the Nebraska Crop Improvement Association, and was elected Chair-Elect of Section O (Agriculture, Food, and Natural Resources) of the American Association for the Advancement of Science.

David Baltensperger was inducted into the Nebraska Hall of Agricultural Achievement.

Kenneth G. Cassman received the Fellow Award from the Crop Science Society of America.

John Doran received the Technology Transfer Award from the USDA Ag Research Service, was a nominee for the "Onassis Prize for the Environment" from the Onassis Foundation in Athens, Greece, and was elected President-Elect of the International Soil Ecology Society and the Soil Science Society of America.

Charles Francis received the Honorary Doctor of Science Degree from the faculty of Agriculture and Forestry, University of Helsinki, Finland.

Gary Hergert received the Fellow Award from the Soil Science Society of America.

Martin Massengale received the Lifetime Trustee award from the Nebraska Council on Economic Education and the Agri-Award for Outstanding Service to Agriculture from the Triumph of Agriculture Exposition.

Lowell Moser was inducted into the Nebraska Hall of Agricultural Achievement.

Gail Wicks received the Fellow Award from the Weed Science Society of America.

Animal Science

Mary Beck received the Helene Cecil Leadership Award from the Poultry Science Association and the Distinguished Alumna Award from Westhampton College, University of Richmond, Virginia.

Don Beermann was named an Honorary Fellow by the American Association for the Advancement of Science.

Mike Brumm received the Animal Management Award from the American Society of Animal Science and was inducted into the Northeast Community College Agricultural Advisory Committee's Hall of Honor.

Chris Calkins received the Signal Service Award from the American Meat Science Association.

Rodger Johnson received the Oklahoma State University Animal Science Advanced Degree Graduate of Distinction Award.

Rick Koelsch was named Engineer of the Year by the Nebraska Section of the American Society of Agricultural Engineers and received the American Society of Agricultural Engineers Blue Ribbon Award for "Manure Matters" Newsletter, 1999 Educational Aids.

Roger Mandigo was the first recipient of the Wendell Burgher Beef Industry Award presented by the Institute of Agriculture and Natural Resources.

Merlyn Nielsen received the Animal Breeding and Genetics Award from the American Society of Animal Science.

Dale Van Vleck was named a Fellow by the American Society of Animal Science.

Biochemistry

Ruma Banerjee was selected as an Established Investigator by the American Heart Association and was selected Chair-Elect, Gordon Research Conference on Enzymes, Coenzymes and Metabolic Pathways '01 by the Gordon Research Conference.

Raymond Chollet was elected Co-Vice-Chair of the Gordon Research Conference on "CO₂-Fixation and Metabolism in Green Plants" in Oxford, U.K., and was elected Co-Chair of the Gordon Conference during Summer 2002 in the United States by the Gordon Research Conference.

Carolyn Price received the NSF Career Advancement Award from the National Science Foundation, and was selected Co-Chair for the NIH workshop on Chromatin and DNA replication by the National Institutes of Health, Co-Organizer of the Eppley Institute Short Course on Cancer Biology by the Eppley Institute faculty, Session Chair for the Cold Spring Harbor Conference on Telomeres by the conference organizers, and Session Chair for FASEB Summer Conference on Ciliate Molecular Biology by the conference organizers.

Biological Systems Engineering

Bruce Dvorak received the University of Nebraska-Lincoln College of Engineering & Technology "Multidisciplinary Research Award".

Glenn J. Hoffman received the Hancor, Inc. Soil and Water Engineering Award for Distinguished Accomplishments in Advancing the Science of Soil and Water Engineering through Research, Leadership, and Administration from ASAE.

Dennis Schulte received the University of Nebraska-Lincoln College of Engineering & Technology "Multidisciplinary Research Award".

Darrell G. Watts received the Pioneer Award for Research and Extension Education Enhancing the Management and Protection of Nebraska's Groundwater Resources from the Nebraska Water Conference Council and IANR.

Wayne Woldt received the University of Nebraska-Lincoln College of Engineering & Technology "Multidisciplinary Research Award".

Entomology

Fred Baxendale received the Tree Planters State Award for Backyard Farmer from the Nebraska Statewide Arboretum, the Herbert H. Davis Recognition Award to the Turfgrass Science Team from the Nebraska Golf Hall of Fame, the Epsilon Sigma Phi Team Award as a member of the Urban Pest Management Team, and was a member of the Festival of Color Team which won the IANR Team Effort Award.

Leon Higley received the Teaching Award of Merit from the University of Nebraska-Lincoln Chapter of Gamma Sigma Delta and the Distinguished Award in Teaching from the North Central Branch of the Entomological Society of America.

Shripat T. Kamble served as a National Director-Elect for the Board Certified Entomologists and Chair of the Examining Committee-Board Certified Entomologists of the Entomological Society of America, and was a National Chair for the National Conference on Urban Entomology.

Lance J. Meinke, Blair D. Siegfried, and Mike Scharf received the USDA-ARS Technology Transfer Award as part of an interdisciplinary team recognized for outstanding cooperative efforts involved in the development, conduct, and evaluation of the Areawide IPM program for corn rootworm.

Robert K.D. Peterson received the Entomology Educational Project Award for the "Insects, Disease, and History" Web Site from the Board Certified Entomologists, Mid-America Chapter.

Food Science and Technology

Mindy Brashears received the Agricultural Communicators Education Silver Award for the video, "Introduction to the Principles of HACCP".

David S. Jackson received the "Outstanding Presentation in Cereal Chemistry" Award from the Corn Refiners Association for a presentation given at the American Association of Cereal Chemists Annual Meeting.

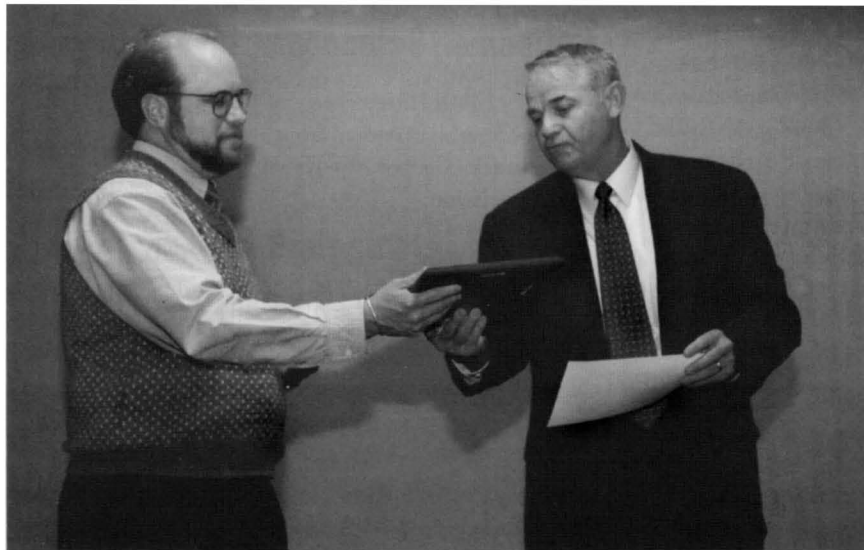
Horticulture Department

Dermot P. Coyne was invited to present the Maiblen Memorial Lecture at the Annual Meeting of the American Society for Horticultural Science and was selected Chair of the Hall of Fame Committee for the American Society of Horticultural Science.

Roch E. Gaussoin received the Outstanding Young Scientist Award from the Nebraska Chapter of Sigma Xi, and as a member of the Turfgrass Science Team received the Herbert H. Davis Memorial Award from the Nebraska Golf Hall of Fame.

Garald L. Horst, a member of the Turfgrass Science Team, received the Herbert H. Davis Memorial Award from the Nebraska Golf Hall of Fame.

Dale T. Lindgren was recognized for 25 years of Federal Civil Service. A pink-flowered carnation released by Bluebird Nursery was named "Dr. Dale Lindgren".



ARD Dean and Director Darrell Nelson (right) presented a 2000 Junior Faculty in Excellence Award to School of Natural Resource Sciences Scientist David Wedin.

Terrance P. Riordan received the Gamma Sigma Delta Research Award and, as a member of the Turfgrass Science Team, received the Herbert H. Davis Memorial Award from the Nebraska Golf Hall of Fame.

Robert C. Shearman, a member of the Turfgrass Science Team, received the Herbert H. Davis Memorial Award from the Nebraska Golf Hall of Fame.

School of Natural Resource Sciences

John Holz was selected to attend the Dissertations Initiative for the Advancement of Limnology and Oceanography Symposium at the Bermuda Biological Station for Research, sponsored by the American Society of Limnology and Oceanography, the National Science Foundation, and the European Commission and was recognized for Outstanding Research in Lake Restoration, Protection, and Management by the North American Lake Management Society.

Shripat T. Kamble served as a National Director-Elect for the Board Certified Entomologists of the Entomological Society of America, Chair of the Examining Committee-Board Certified Entomologists of the Entomological Society of America, and a national Chair for the National Conference on Urban Entomology.

David Wedin received the Junior Faculty Excellence in Research Award from the Agricultural Research Division.



Jeffrey Cirillo (right) of the Veterinary and Biomedical Sciences Department received a 2000 Junior Faculty Excellence in Research Award from ARD Dean and Director Darrell Nelson.

Veterinary and Biomedical Sciences

Dale M. Grotelueschen received the Extension Award from the Nebraska Chapter of Gamma Sigma Delta.

Jeffrey D. Cirillo received the Junior Faculty Excellence in Research Award from the Agricultural Research Division.

Family and Consumer Sciences

Mary Ellen Rider received the New Specialist Award from the Nebraska Cooperative Extension Association.

Nutritional Science and Dietetics

Kaye Stanek received the Huddleson Award for research from the American Dietetic Association Foundation.

Textiles, Clothing and Design

The Textiles, Clothing and Design Department received the American Textile Manufacturers Institute Award of Excellence.

Rita Kean received the Fellow Award from the International Textile and Apparel Association.

Northeast Research and Extension Center

Michael C. Brumm received the Animal Management Award from the American Society of Animal Science.

Panhandle Research and Extension Center

Alexander D. Pavlista received the Certificate of Appreciation from the United States Department of Agriculture.

Dean Yonts received the ASAE Educational Aids Competition, Manuals or workbooks category — Blue Ribbon Award for Sprinkler Irrigation Systems - MWPS - 30, First Edition, Midwest Plan Service, Iowa State University.

Dean Yonts received the ASAE Educational Aids Competition, Web page category — Blue Ribbon Award for Managing Irrigation and Nitrogen to Protect Water Quality.

West Central Research and Extension Center

Don C. Adams received the Holling Family Award for Teaching Excellence from the Institute of Agriculture and Natural Resources.

Graduate Student Awards and Recognitions

One of the primary missions of the ARD research program is to develop the scientists of tomorrow. We are committed to providing exceptional graduate students with the opportunity to work with and learn from our research faculty.

ARD is among the national leaders in research in food production and processing, natural resources management and family sciences. Approximately 689 graduate students are pursuing advanced degrees with ARD faculty. The quality of our graduate students is reflected in the recognition they receive.

Agricultural Economics

Saleem Shaik received the Dr. James B. Hassler Award for Outstanding Research from the Department of Agricultural Economics.

Agronomy

Mine Aslan received the Henry Beachell Fellowship from the Department of Agronomy and the Milton E. Mohr Fellowship from the Center for Biotechnology.

Michael G. Burton received the Milton E. Mohr Fellowship from the Center for Biotechnology.

B. Todd Campbell received the Graduate Student Award from the National Council of Commercial Plant Breeders.

Devinder Sandhu received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Martin M. Williams II received the Henry Beachell Fellowship from the Department of Agronomy and the Milton E. Mohr Fellowship Award from the Center for Biotechnology.

Animal Science

Mark Allan was selected as one of five finalists for the Young Investigator Award by the North American Association for the Study of Obesity.

Jesus Arango received the Ned S. and Esther B. Raun International Graduate Fellowship from the Department of Animal Science.

Samar Elnagar received a Graduate Student Award of Excellence in recognition of her outstanding research presentation from the Poultry Science Association.

Galen Erickson received the John Hallman Memorial Award from the Department of Animal Science.

Christy Gladney received the Neal A. Jorgenson Genome Travel Grant from the U.S. Pig Genome Coordinator.

Mohammad Jalal received a Graduate Student Award of Excellence in recognition of his outstanding research presentation from the Poultry Science Association.

Nancy Jerez received the Second Place Award for the M.S. Poster Paper Competition from the American Meat Science Association.

Diane Moody received the Folsom Doctoral Dissertation Award and the Graduate Student Award from the Nebraska Chapter of Sigma Xi.

Curtis Novak received a Graduate Scholarship from Continental Grain.

Janice Rumph received the Frank Baker Graduate Student Essay Award from the Beef Improvement Federation.

Hiroko Taira received a Mary and Charles Cooper/Emma Sharpless Fellowship from the Agricultural Research Division and the College of Agricultural Sciences and Natural Resources.

Biochemistry

Tom Beardslee received the Milton E. Mohr Fellowship for Academic Year 1999-2000 from the College of Agriculture and Natural Resources.

Biological Systems Engineering

Charles M. Hardekopf received a Milton E. Mohr Research Fellowship from the Center for Biotechnology.

Michael Rinkol received a Milton E. Mohr Research Fellowship from the College of Engineering and Technology.

Entomology

Nor Aliza Abdul Rahim received the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee.

Leela Alamalakala received the Milton E. Mohr Scholarship from the Center for Biotechnology.

James W. Austin received a Fellowship from the Fulbright Foundation.

Jon Bedick received the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee and a Graduate Research and Creative Activity Symposium Award from Graduate Studies.

Tom Clark received the Graduate Studies Fellowship from the Dean of Graduate Studies, the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee, an Entomology Graduate Student Training Program Internship from Dow Agro-Sciences. He won Second Place in the Ph.D. Student Poster Competition and was a member of the Linnaean Team which won Second Place at the Entomological Society of America meetings.

Eric Durham received the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee.

J. Lester Figarola received the Shear-Miles Fellowship Award from the Agricultural Research Division.

Fikru Haile received Second Place in the Ph.D. Student Poster Competition at the Entomological Society of America meetings.

Tiffany Heng-Moss received the Graduate Studies Fellowship from the Dean of Graduate Studies, the Graduate Scholarship from the North Central Branch Entomological Society of America Interdisciplinary Grant Program, a Hardin Distinguished Graduate Fellowship from the Agricultural Research Division, and First Place in the Ph.D. Student Paper Competition from the Entomological Society of America.

W. Wyatt Hoback received a grant from the Nature Conservancy, Nebraska Chapter and a Presidential Graduate Fellowship from the Dean of Graduate Studies.

Paula Macedo received the Mary and Charles C. Cooper/Emma I. Sharpless Fellowship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division.

Tulio Macedo received the Mary and Charles C. Cooper/Emma I. Sharpless Fellowship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division.

Pari Pachamuthu received First Place President's Prize for oral Ph.D. research presentation at the Entomological Society of America meetings and a Ward A. and Helen W. Combs Scholarship from the Presto-X Company, Omaha, NE.

Srinivas Parimi received the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee and was a member of the Linnaean Team which received Second Place at the Entomological Society of America meetings.

Aura Paucar received the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee.

Lilian Saldanha received the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee.

Andrew Smith received the Travel Grant Award from International Affairs and Keith Kevan and Entomological Society of Canada fellowships.

Julia Smith received a grant from the Nature Conservancy, Nebraska Chapter and a grant from the Center for Great Plains Studies.

Hasan Tunaz received a student travel grant to the Entomological Society of America meetings from the Bruner Club Executive Committee.

Karla Villatoro received the Travel Grant Award from the Nebraska Chapter of Sigma Xi and the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee.

Food Science and Technology

Lynne Becker received the Student Travel Award from the American Society for Microbiology.

Lisa Durso, a USDA Ph.D. Fellowship student received a USDA International Travel Award.

George Stearns received the Achievement Award and a Student Travel Award from the Institute of Food Scientists. He was chosen as a Student Representative for the Biotechnology Division of the Institute of Food Scientists.

School of Natural Resource Sciences

James W. Austin received a Fulbright Research Fellowship from the Fulbright Foundation.

Pari Pachamuthu received the First Place President's Prize for oral Ph.D. research presentation from the Entomological Society of America and the number three paper presentation at the Agronomy Society of America annual meeting.

Tiffany Heng-Moss received the NBC Graduate Scholarship Award and the Hardin Distinguished Graduate Fellowship.

Nedim Mutlu was awarded the Milton E. Mohr Fellowship from the Center for Biotechnology and the College of Engineering and Technology and the Shear-Miles Fellowship Award from the Agricultural Research Division.

Veterinary and Biomedical Sciences

Aruna Ambagala received a Milton E. Mohr Fellowship from the Center for Biotechnology and the College of Engineering and Technology and the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Marilyn Buhman received the Mary and Charles C. Cooper/Emma I. Sharpless Fellowship Award from the College of Agricultural Sciences and Natural Resources.

Sahara H. El-Etr received the Milton E. Mohr Fellowship Award from the College of Agricultural Sciences and Natural Resources.

Zhengyu Feng received a Milton E. Mohr Fellowship from the Center for Biotechnology and the College of Engineering and Technology.

Madeline K. Roberts was accepted with distinguished honor into the Morris Animal Foundation's Fellow Program.

Douglas S. Zatechka, Jr., received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Peng Zhang received a Midwest Student Biomedical Research Forum Award from the American Medical Association Education and Research Foundation and Pfizer Incorporated Animal Health Research.

Family and Consumer Sciences

Jean Chicoine received the Effie Riatt Fellowship from the American Association of Family and Consumer Sciences.

Susan Meyerle received the Graduate Scholarship Award from the Nebraska Association of Family and Consumer Sciences.

Nutritional Science and Dietetics

Jun Ma received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Textiles Clothing and Design

Ying Zhou received the Lowe R. & Mavis M. Folsom Distinguished Master's Thesis Award.

Undergraduate Honors Student Research Program

The purpose of this new program is to allow outstanding University Honors Program students to conduct research under the direction of a faculty mentor. The program is open to junior and senior Honors Program participants proposing to work with a faculty member who has an ARD appointment. A subcommittee of the ARD Advisory Council selects awardees based on the quality of the proposal. Proposals are authored by the students with guidance from the proposed project mentors.

Agricultural Leadership, Education and Communication

Alana Cent and Catherine Keown received an Honors Award for "Exploring Parental Collaboration in a National Early Childhood Development Program" from the Agricultural Research Division. (S. Fritz, Advisor)

Kristyn M. Harms received an Honors Award for "Pragmatic and Professional Impact of Character Education" from the Agricultural Research Division. (S. Fritz, Advisor)

Animal Science Department

James P. Rhea received an Honors Award for "Correlation of Beef Longissimus Muscle Tenderness at the 5th Rib and 12th Rib Locations" from the Agricultural Research Division. (C. Calkins, Advisor)

Biochemistry Department

Marissa Carstens received an Honors Award for "Non-symbiotic Plant Hemoglobins" from the Agricultural Research Division. (G. Sarath, Advisor)

Brenda M. Chrastil received an Honors Award for "The Role of Plasmids in the Degradation of the Herbicide, Dicamba, by *Pseudomonas maltophilia*, Strain DI-7". (D. Weeks, Advisor)

A. Mark James received an Honors Award for "Evaluation of the Reversible Phosphorylation of Phosphoenolpyruvate Carboxylase in Leaves of the C4 Plant Maize by Polyclonal Antibody Assays" from the Agricultural Research Division. (R. Chollet, Advisor)

Russell A. Miller received an Honors Award for "In vivo Functional Analysis of a Novel Chloroplast Gene Promoter" from the Agricultural Research Division. (L. Allison, Advisor)

Veterinary and Biomedical Sciences

Katherine Irwin received an Honors Award for "Understanding Cattle Behavior to Maximize Recovery of Food-Borne Pathogens" from the Agricultural Research Division. (D.R. Smith, Advisor)

Variety and Germplasm Releases

ARD faculty involved in plant breeding and genetics research make important contributions to the improvement and development of agricultural and horticultural crops.

Public breeding programs such as ARD's are essential to the continued enhancement of plant germplasm. These programs provide the resources and flexibility to pursue long-term breeding programs in crops that may not have a current commercial interest. They also can address genetic, cultural and management interactions characteristic of today's agriculture, as well as the future's.

Germplasm releases provide improved genetic material that is integrated into private and public plant breeding programs. Other releases occur as new cultivars (varieties), which are increased through the Foundation Seed Division and then provided to seed companies for production of certified seed. The following releases were made in 1999.

Agronomy

Crop: Foxtail Millet [*Setaria italica* (L.) Beauv.]

Germplasm

Release: N-Si-1, N-Si-2, N-Si-3, N-Si-4, and N-Si-5

Scientists: M.M. Siles, D.D. Baltensperger, L.A. Nelson, A. Marcon, and G.E. Frickel

Characteristics: These lines were identified as sources of three pigment (plant color, anther color, and seed coat color) and three morphological (bristle development, earhead density, and seed shape) genetic markers in half diallel crosses among seven parental lines. The pigmentation is purple or green and is conditioned by a single factor, with purple dominant over green. N-Si-2 and N-Si-4 develop purple pigment. N-Si-1, N-Si-3, and N-Si-5 are green throughout the plant, which crossed to N-Si-2 and N-Si-4 produce purple F₁ plants and, in the F₂, the progenies segregate into 3 purple to 1 green ratio. The emerging anthers at flowering are orange with a tinge of varying degree of brown

(blackish brown when dry) or white, even when dry. The orange anther color is dominant over white. Seed coat color varies from light buff to brick red. N-Si-4 and N-Si-5 develop light buff seeds, N-Si-1 and N-Si-3 have cinnamon buff seed coats, and N-Si-2 produces brick red seeds. N-Si-1, N-Si-2, N-Si-3, and N-Si-5 develop dense earheads; however, the spikes of N-Si-1 and N-Si-2 are relatively more compact than those of N-Si-3 and N-Si-5. The spike of N-Si-4 is lax. Round seeds are produced by N-Si-1 and N-Si-4, while N-Si-2, N-Si-3, and N-Si-5 develop elliptical seeds.

Crop: Grain Pearl Millet (*Pennisetum glaucum*)

Germplasm

Release: NM-8, NM-9, and NMH-1

Scientists: D.J. Andrews and J.F. Rajewski

Characteristics: NM-8 is a medium late maturity (± 65 days after planting), narrow leaf, dwarf, synchronous tillering (1-2 tillers/plant), bristled (2 cm), purple plant inbred about 0.8 m tall. It has ovate-shaped, purple seeds (7.0 g/1000) and has yellow anthers. NM-9 is a leafy, dwarf, synchronous tillering (1 tiller per plant), non-bristled later maturing (± 70 d after planting) purple plant inbred 1.0 m tall with purple grain and a stiff stalk. It has ovate-shaped, purple seeds (6.0 g/1000) and has yellow anthers. The purple pigmentation is light induced and only begins to show after a juvenile phase of about 18 days. The daily growth of the emerging leaf or head is green in the morning, becoming pigmented later in the day. While the lamina of the leaves is purple, the midrib is red. The F₁ hybrid of NM-8 x NM-9 (NMH-1) produces a vigorous plant with 2-3 tillers with lush purple foliage and attractive purple bristled panicles suitable for ornamental use in gardens and urban landscape areas. The hybrid has value to flower seed companies that want to market a new product. It was ranked first out of 10 entries in the 1998 AAS flower section, which was judged at 33 locations in North America.

Crop: Grain Sorghum [*Sorghum bicolor* (L.) Moench]

Germplasm Release: Restorer Line N312R

Scientists: M.W. Witt, P.K. Verma, R.T. Wilson, F. Zavala-Garcia, and J.D. Eastin

Characteristics: The primary utility properties of this line are 1) a good level of stress resistance pertinent to the U.S. Great Plains and as far south as north central Mexico, plus high yield capacity under good conditions, and 2) the ability of the line to simultaneously confer heterosis for both the seed number and seed weight components of yield in its hybrids. N312R is a purple plant, and its hybrids tend to be at the upper level of height acceptability under higher yield Great Plains conditions. The relationship between yield components in selected N312R hybrids differs from the common perception that yields increase when seeds/m² increase, which usually means reduced grain weight. Mid parent mean heterosis for yield in some N312R hybrids is derived from simultaneous heterosis for both seed number and seed weight or heterosis for seed weight without reductions in seed number. The N312R genes for conferring heterotic responses for yield via simultaneous heterosis for seed number and seed weight should be useful incorporations into proprietary commercial lines known to have other desirable characteristics. Also, the stress resistance level of N312R may be of value in many breeding programs, especially where high yield levels during favorable years are of concern.

Crop: Grain Sorghum [*Sorghum bicolor* (L.) Moench]

Germplasm Release: N313, N314, and N315

Scientists: J.F. Pedersen and J.J. Toy

Released By: United States Department of Agriculture Agricultural Research Service and the University of Nebraska Agricultural Research Division

Characteristics: N313, N314, and N315 were developed with the goal of capturing the desirable characteristics of IA28 in pollinator lines with improved seed quality. The three germplasm lines are white seeded and do not have pigmented testa. N313 has purple plant color. N314 and N315 have tan plant color. N314 exhibited highest seed yield. These germplasm lines are a source of IA28 derived materials in plant types adapted to the northern portion of the U.S. sorghum production region, and are suited for the

production of high quality grain for feed or food. They have immediate application for use as a source of grain quality characters in applied breeding programs.

Crop: Grain Sorghum [*Sorghum bicolor* (L.) Moench]

Germplasm Release: N316, N317, N318, N319, N320

Scientists: J.F. Pedersen and J.J. Toy

Released By: United States Department of Agriculture Agricultural Research Service and the University of Nebraska Agricultural Research Division

Characteristics: These genetic stocks are near iso-lines of Bwheatland (Btx399) and contain the nuclear male-sterility genes *ms1*, *ms2*, *ms3*, *ms7*, or *al*. They have immediate application for basic research of the various nuclear male-sterility genes on sorghum performance or on the performance of breeding systems used for sorghum improvement.

Crop: Grain Sorghum [*Sorghum bicolor* (L.) Moench]

Germplasm Release: 20 Near-Isogenic genetic stocks (N321- N340)

Scientists: J.F. Pedersen and J.J. Toy

Released By: United States Department of Agriculture Agricultural Research Service and the University of Nebraska Agricultural Research Division

Characteristics: These genetic stocks are characterized by white seed/tan necrotic plant color (N321, N322, N323, N324, N325), red seed/tan necrotic plant color (N326, N327, N328, N329, N330), white seed/purple necrotic plant color (N331, N332, N333, N334, N335), red seed/purple necrotic plant color (N336, N337, N338, N339, N340). The 20 sorghum genetic stocks are S8 segregates of a single S3 family from the BC1 generation of the cross (BTx398 *ms3* x BTx630) *ms3* x BTx630. They were developed with the goal of making seed available to test hypotheses concerning the combined effects of plant color and pericarp color in a similar genetic background. They would be expected to have approximately 97% common nuclear genes with the exception of those controlling pericarp color and necrotic plant color. These genetic stocks have immediate application for basic research on the effects of plant color and pericarp color on sorghum performance, quality, and biotic and biotic stress resistance.

Crop: Grain Sorghum [*Sorghum bicolor* (L.) Moench]

Germplasm Release: Population NP41B

Scientists: D.T. Rosenow, J.D. Eastin, F. Zavala-Garcia, P.K. Verma, and C. Petersen

Characteristics: Traits of value in NP41B are 1) availability of an excellent mid- to full-season B germplasm population adapted to the Great Plains, and 2) a B germplasm population of tan plants with light colored seeds to enhance both domestic and export marketability for superior poultry feed and for food grain use as well as for normal pig and cattle feed uses. It will provide commercial breeders with a good alternative source of tan plant B germplasm. No other tan plant B population is available to commercial breeders. Public breeders may find maturity and height characteristics useful also.

Crop: Corn (*Zea mays* L.)

Germplasm Release: Inbred N547

Scientists: N.E. D'Croz-Mason and J.E. Foster

Characteristics: N547 is a yellow endosperm maize inbred germplasm with sources of resistance to European Corn Borer *Ostrinia nubilalis* (Huber) stalk and shank tunneling damage (second generation ECB). Although N547 contains tropical germplasm, it is adapted to Nebraska. It has uniform and open tassels, is a good pollen shedder, and at Lincoln, Nebraska requires 72 days to pollen shedding. Synchronization between pollen shed and silk emergence is good with silk emergence beginning two days after pollen shed begins. N547 produces quite uniform and sturdy plants with plant and ear height of 1.90 and 0.78 m. Ears are conical with 12 to 14 rows of dent kernels. N547 has not been evaluated for disease nor other pest resistances.

Crop: Corn (*Zea mays* L.)

Germplasm Release: Inbred N548

Scientists: N.E. D'Croz-Mason and J.E. Foster

Characteristics: N548 is a yellow endosperm maize inbred germplasm with sources of resistance to European Corn Borer *Ostrinia nubilalis* (Huber) stalk and shank tunneling damage (second generation ECB). Although N548 contains tropical germplasm, it is adapted to Nebraska. It has uniform and open tassels, and at Lincoln,

Nebraska, requires 78 days to pollen shedding. Synchronization between pollen shed and silk emergence is good with silk emergence beginning two days after pollen shed begins. N548 has good combining ability for ECB and produces moderately sturdy medium to tall plants with plant and ear height of 2.00 and 1.00 m. Ears are conical with 12 to 14 rows of dent kernels. It is primarily recommended for use as germplasm for line development.

Crop: Corn (*Zea mays* L.)

Germplasm Release: NECB549

Scientists: N.E. D'Croz-Mason and J.E. Foster

Characteristics: NECB549 is a yellow endosperm maize population with sources of resistance to European Corn Borer *Ostrinia nubilalis* (Huber) stalk and shank tunneling damage (second generation ECB). Although the population NECB549 contains tropical germplasm, it is adapted to Nebraska. This population is ample for pollen shedding, with an average pollen duration. The tassels are open and have good branching. At Lincoln, Nebraska, it requires 61 to 63 days to pollen shedding. Synchronization between pollen shed and silk emergence is good with silk emergence beginning two days after pollen shed begins. Plant and ear height range from 1.80 - 2.00, and 0.50-0.90 m. Ears are conical ranging from 9 to 17 cm in length, and kernel rows from 12 to 18. Kernels are dent and semifloury. It has yellow kernels, white cobs, dark green plant color, with excellent kernel quality. The families that make up population NECB549 have been tested for ECB, not the population itself; these families have not been tested for other pests nor disease resistance. NECB549 is primarily recommended for use as germplasm for line development.

Crop: Soybean [*Glycine max* (L.) Merr.]

Variety Release: NE3297

Scientists: G.L. Graef

Characteristics: NE3297 is derived from the cross 'Parker' x 'Asgrow A3935'. It is a mid-Maturity Group III cultivar with indeterminate growth habit, white flowers, tawny pubescence, and brown pods at maturity. Seeds are dull yellow with a brown hilum. Over two years of Uniform Regional Tests in 41 environments (1995-96), NE 3297 matured 3 d earlier than 'Macon', with slightly higher yield, 10 cm taller plant height, similar

seed weight and oil content, with 9 g kg⁻¹ higher seed protein content. In Nebraska tests in 12 environments (1996-98), NE3297 yielded 5.2% better than Macon. NE3297 matured 2 d earlier than Macon, with better lodging score, 12 cm taller plant height, similar seed size, and slightly higher protein and oil content. NE3297 is susceptible to brown stem rot and phytophthora rot. It shows moderate resistance to iron deficiency chlorosis on high-pH soils.

Crop: Soybean [*Glycine max* (L.) Merr.]
Variety Release: NE3400
Scientists: G.L. Graef
Characteristics: NE3400 is derived from the MSBP1 population, an intermated population using *ms2* male sterility to facilitate intermating. It is a mid-Maturity Group III cultivar with indeterminate growth habit, purple flowers, gray pubescence, and tan pods at maturity. Seeds are dull yellow with a buff hilum. Over two years of Uniform Regional Tests (1997-98), NE 3400 matured 1 d earlier than 'Macon', with similar yield, plant height, and seed weight, and 11 g kg⁻¹ greater seed protein content. In Nebraska tests during 1997-98, NE3400 yielded 66 bu/a, compared with 62 for Macon. NE3400 matured 2 days later than Macon, with similar lodging score, plant height, and seed weight. It is susceptible to brown stem rot and phytophthora rot.

Crop: Soybean [*Glycine max* (L.) Merr.]
Variety Release: NE1900
Scientists: G.L. Graef
Characteristics: NE1900 is derived from the MSBP1 population, an intermated population using *ms2* male sterility to facilitate intermating. It is a late Maturity Group I cultivar with indeterminate growth habit, white flowers, gray pubescence, and brown pods at maturity. Seeds are dull yellow with a yellow hilum. Over two years of Uniform Regional tests (1997-98), NE1900 was the highest yielding entry and matured 1 d earlier than Marcus 95, with 2 bu/acre higher yield, similar plant height, 10 mg seed⁻¹ lower seed weight, and similar seed protein and oil content. In Nebraska tests during 1997-98, NE1900 matured 3 days earlier than IA2021 and yielded 64.2 bu/a, compared with 63.7 for IA2021. NE1900 had a slightly higher lodging score, similar plant height, and smaller seed weight compared with IA2021. It is susceptible to brown stem rot and phytophthora rot.

Crop: Barley (*Hordeum vulgare* L.)
Variety Release: P-954
Scientists: P.S. Baenziger, K.M. Kim, J. McNeill, L. Oberthur, T. Berke, T. Payne, S. Dofing, and J.W. Schmidt (deceased)
Characteristics: P-954 is a new six-rowed, winter, feed barley variety selected from the cross Hitchcock/Maury/Hitchcock. It was released on the basis of its superior winter hardiness, straw strength, and grain yield under dryland conditions. It has rough awns, and its covered kernels have long rachilla hairs and a yellowish aleurone. The spike is medium lax and medium in length. In 20 trials grown in Nebraska (1990-1998), P-954 yielded 56.1 bu/a. This yield was higher than Dundy (49.8 bu/a), Hitchcock (42.4 bu/a), and Perkins (49.9 bu/a). Grain volume weight is similar to that of Dundy and higher than that of Hitchcock. At mature plant height, P-954 is about 2 inches shorter than Perkins and has good straw strength. It flowers similarly to Perkins, but 2 days earlier than Hitchcock and Dundy. P-954 has a similar winter hardiness to Hitchcock and Dundy but is superior to Perkins. It has better resistance to powdery mildew than Perkins and Hitchcock, but is more susceptible than Dundy. It is moderately susceptible to leaf rust and barley yellow dwarf virus. Based on current information, P-954 is best adapted to dryland production in western Nebraska and southern Great Plains where winterkilling is less frequent than in eastern Nebraska.

Crop: Barley (*Hordeum vulgare* L.)
Variety Release: P-721
Scientists: P.S. Baenziger, K.M. Kim, J. McNeill, L. Oberthur, T. Berke, T. Payne, and J.W. Schmidt (deceased)
Characteristics: P-721 is a new six-rowed, winter, feed barley variety released on the basis of its superior winter hardiness, disease resistance, and grain yield under dryland conditions. It has rough awns, and its covered kernels have long rachilla hairs and a yellowish aleurone. The spike is medium lax and medium long. In 17 trials grown in Nebraska (1991-1998), P-721 yielded 50.9 bu/a. This yield was higher than Dundy (47.4 bu/a), Hitchcock (39.7 bu/a), and Perkins (49.4 bu/a). Grain volume weight is similar to that of Perkins, Hitchcock, and Dundy (48 lb/bu). At mature plant height, P-721 is about 1.5 inches shorter than Perkins

(31 in) and similar to Hitchcock and Dundy (29.5 in), and has good straw strength. It flows similarly to Perkins, and about 2 days earlier than Hitchcock and Dundy. P-721 has a similar level of winter hardiness to Hitchcock and Dundy, but is superior to Perkins. It has better resistance to powdery mildew than Perkins and Hitchcock, but is more susceptible than Dundy. It is moderately susceptible to leaf rust but has better resistance than Hitchcock and Dundy. It is moderately resistant to barley yellow dwarf virus (BYDV) and is superior to Perkins, P-954, and Hitchcock. Based on current information, P-721 is best adapted to dryland production in western Nebraska and southern Great Plains where winterkilling is less frequent than in eastern Nebraska. In areas where BYDV occurs frequently to cause significant yield losses, P-721 would be a preferred variety.

Crop: Hard Red Winter Wheat (*Triticum aestivum* L.)

Variety Name: Culver (P.I. 606726)

Scientists: P.S. Baenziger, B. Moreno-Sevilla, C.J. Peterson, D.R. Shelton, R.W. Elmore, P.T. Nordquist, R.N. Klein, D.D. Baltensperger, L.A. Nelson, D.V. McVey, J.E. Watkins, and J.H. Hatchett

Released By: University of Nebraska Agricultural Experiment Station and the United States Department of Agriculture Agricultural Research Service

Characteristics: 'Culver' was released primarily for its superior adaptation to dryland wheat production systems in southern and central Nebraska and similar growing areas in adjacent states. Culver is an awned, white-glumed cultivar. Its field appearance is most similar to 'Alliance', although not as yellow-green in color. After heading, the canopy is moderately open and upright. The flag leaf is erect and twisted at the boot state. The foliage is green with a waxy bloom at anthesis. The leaves are glabrous. The spike is tapering in shape, moderately long to long, and middense. The glume is midlong and midwide

to wide, and the glume shoulder is sloping to square. The beak is short in length with an acuminate tip. The spike is usually nodding at maturity. Kernels are red colored, hard textured, and ovate to elliptical in shape. The kernel has no collar, a large brush of medium length, rounded cheeks, midsize to large germ, and a narrow and shallow crease. The main advantage Culver has when compared to most other available wheat cultivars, within its area of adaptation, is its high grain yield and superior leaf rust resistance in dryland production systems. It is medium in maturity and has a medium length coleoptile. Culver has moderately strong straw strength, and good to very good winter-hardiness similar to Abilene and comparable to other winter wheat cultivars adapted and commonly grown in Nebraska. The overall end-use quality characteristics for Culver should be acceptable to the milling and baking industries.

Plant Pathology

Crop: Dry Bean

Germplasm

Release: BelMiNeb-RMR-6 and -7 erect, short vine, rust and mosaic resistant great northern germplasm lines.

Scientists: J.R. Stavely, J.D. Kelly, J.R. Steadman, D.P. Coyne, and D.T. Lindgren

Released By: United States Department of Agriculture Experiment Station and Nebraska Agricultural Research Division

Characteristics: Multiple disease resistance, upright plant type. BMN-RMR-6 has four genes for rust and mosaic resistance that are in previously released BMN-RMR-4 and -5, but a more desirable combination of plant habit and seed characteristics than these previous releases. BMN-RMR-7 is the first release great northern bean to combine the *UR-3* and the *UR-4* and *UR-11* rust resistance genes.

Copyright and patent protection is an important parameter in research. It is especially important for discoveries and innovations that have a potential commercial application. Therefore, from time to time, the ARD (and the University) may determine that the public good is best served with regard to technology transfer by entering into an agreement with a public or private institution which provides that institution with proprietary interests in specific research. The research of ARD scientists often can lead to a patent. Most of the patents that have been awarded to ARD scientists have been for equipment developments and specialized processes. These patents often are licensed by private industry, with royalties being reinvested in future ARD research. The following copyright and patents were awarded in 1999.

Agronomy

Patent Title: Method for transforming soybean
Patent Number: 5,959,179
Scientists: M.A. Hinchee, T.E. Clemente, J.E. Fry, A.R. Howe, D. Conner-Ward, M.J. Fedele, and R.J. Rozman
Description: Methods and materials for the production of transgenic soybeans are disclosed. Preparation of explants from specific regions of soybean seedlings resulted in improved transformation efficiencies. Incubation of soybean seedlings between about 0 degree. C. and about 10 degree. C. prior to preparing explants was found to be further beneficial to the preparation of transgenic soybeans.

Animal Science

Patent Title: A feeding program for the production of feed to produce omega-3 fatty acid enriched eggs and methods for producing such eggs
Patent Number: 5,897,890
Scientist: S.E. Scheideler
Description: Production of omega eggs is a patent for the feeding and management of laying hens to produce eggs enriched with n-3 fatty acids, specifically 250 mg linoleic acid and 100-120 mg DHA. The feeding regime includes feeding flaxseed to hens in a cost-effective program designed to not diminish production of the laying hen. Consumption of omega eggs has been tested in consumer groups and has been found to decrease serum triglycerides in hypercholesterolemic subjects without risk to serum cholesterol levels.

Biological Systems Engineering

Patent Title: Method and apparatus for production of levulinic acid via reactive extrusion
Patent Number: 5,859,263
Scientists: V. Ghorpade and M.A. Hanna
Description: The present invention relates to a continuous process for preparing levulinic acid from starch in a reactive extrusion process. In a preferred embodiment the extrusion takes place in a twin-screw extruder having a plurality of temperature zones wherein the starch slurry is preconditioned, extruded, filter pressed, reboiled, vacuum distilled, condensed, centrifuged, whereby the waste effluent from the centrifugation is reprocessed upstream to the preconditioning stage.

Food Science and Technology

- Patent Title:** Method for liquefaction of cereal grain starch substrate and Apparatus therefore.
- Patent Number:** U.S. 5,981,237
- Scientists:** M.M. Meagher and D.D. Grafelman.
- Description:** A method and apparatus are disclosed for liquefaction of starch derived from cereal grain. A single-screw extruder is utilized to gelatinize a starch substrate providing significant advantage over prior art jet steam cookers. Liquefaction of the gelatinized starch substrate is completed by post-extrusion bioreaction of the starch with a steele-mixer reactor. An alpha-amylase enzyme is utilized to facilitate the liquefaction process. The liquefacted starch substrate is heated after bioreaction to achieve complete digestion of remaining starch inclusions. Liquefacted starch substrates utilizing the disclosed process significantly reduce the amount of energy required in the conversion of starch to fermentable sugars in the production of ethanol.

Plant Pathology

- Patent Title:** Transgenic Plants Co-expressing a Functional Human 2-5A System Resist Virus Infection
- Patent Number:** 5,866,787
- Scientists:** A. Mitra and R.H. Silverman
- Description:** This patent is for an anti-viral system that provides broad-spectrum resistance against all economically important virus diseases of crop plants.

Veterinary and Biomedical Sciences

- Patent Title:** Nucleotide Sequences and Method for Detection of *Serpulina hyodysenteriae*
- Patent Number:** 5,698,394; 5,869,630; 6,068,843
- Scientists:** G.E. Duhamel and R.O. Elder
- Description:** The invention provides for methods, kits, and composition useful for diagnosis and monitoring of infection of animals with *Brachyspira* (formerly *Serpulina*) *hyodysenteriae*. The compositions include a method for detecting the presence of *B. hyodysenteriae* in a biological sample, an oligonucleotide primer and a *B. hyodysenteriae*-specific oligonucleotide probe useful in that method, and an article of manufacture that contains the primers and/or probe. Also provided are an about 2.3-kb DNA fragment derived from genomic DNA of *B. hyodysenteriae* and encoding for an about 56 kDa polypeptide, a recombinant expression vector containing the DNA fragment, the 56 kDa polypeptide and a monoclonal antibody reactive with the peptide, and a method of assaying for antibodies reactive with the 56 kDa peptide.

ARD is one of five divisions within the Institute of Agriculture and Natural Resources (IANR) at the University of Nebraska. IANR was established by the Nebraska legislature in 1973 and has its headquarters on the University of Nebraska-Lincoln East Campus. The University of Nebraska system has four campuses: University of Nebraska-Lincoln, University of Nebraska Medical Center, University of Nebraska at Omaha and the University of Nebraska at Kearney. The University of Nebraska system is governed by an elected Board of Regents and administered by a system and campus administration.

Administrative Personnel (June 2000)

University of Nebraska Board of Regents

Robert M. Allen, Hastings	Nancy O'Brien, Waterloo
Don S. Blank, McCook	Kent Schroeder, Kearney
Chuck Hassebrook, Walthill	Rosemary Skrupa, Omaha
Drew Miller, Papillion	Charles S. Wilson, Lincoln

Student Regents

UNMC	—	Allison Cushman
UNO	—	William Marunda
UNL	—	Joel Schafer
UNK	—	Ryan Samuelson

Administrative Officers

L. Dennis Smith, President, University of Nebraska

James C. Moeser, Chancellor, University of Nebraska-Lincoln

Irvin T. Omtvedt, Vice Chancellor, Institute of Agriculture and Natural Resources and Vice President, University of Nebraska

Agricultural Research Division

Darrell W. Nelson, Dean and Director

Dale H. Vanderholm, Associate Dean and Director

Rita C. Kean, Interim Assistant Director/Human Resources
and Family Sciences

Steven S. Waller, Assistant Dean and Director

Dora Dill, Administrative Technician

Nelvie Lienemann, Staff Assistant

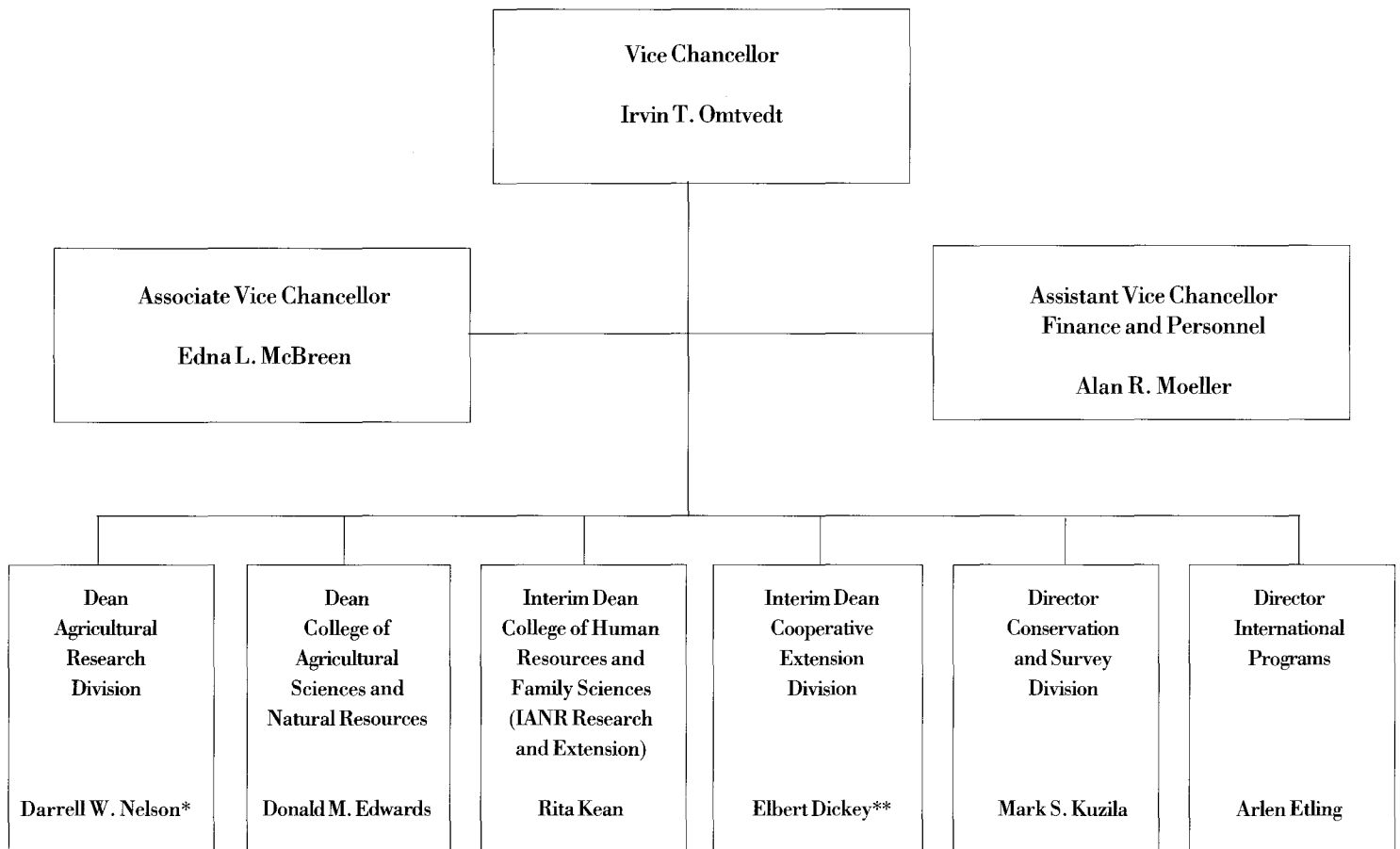
Diane Mohrhoff, Project Assistant

Shirley McCain¹, Temporary/On Call

¹Temporary appointment

Organizational Chart

Institute of Agriculture and Natural Resources University of Nebraska-Lincoln June 2000



*Director, Nebraska Agricultural Experiment Station

**Director, University of Nebraska Cooperative Extension

**Administrative Units Reporting to Agricultural Research Division
Institute of Agriculture and Natural Resources
The University of Nebraska-Lincoln
June 2000**

Agricultural/Natural Resources Units

Agricultural Economics
Jeffrey Royer, Head

Agricultural Leadership, Education and Communication
Earl Russell, Head

Agronomy
Kenneth Cassman, Head

Animal Science
Donald Beermann, Head

Biochemistry
Robert Klucas, Head

Biological Systems Engineering
Glenn Hoffman, Head

Biometry
David Marx, Chair

Entomology
Z B Mayo, Head

Food Science and Technology
Steve Taylor, Head

Horticulture
David Lewis, Head¹
Garald Horst, Interim Head²

Plant Pathology
Anne Vidaver, Head

School of Natural Resource Sciences
Blaine Blad, Director¹
Ted Elliott, Director²

Veterinary and Biomedical Sciences
Jack Schmitz

Human Resources and Family Sciences Departments

Family and Consumer Sciences
Shirley Baugher, Chair¹
Judy Johnson, Interim Chair²

Nutritional Science and Dietetics
Marilynn Schnepf, Chair

Textiles, Clothing and Design
Rita Kean, Chair¹
Pat Crews, Interim Chair²

Off-Campus Research Centers

Agricultural Research and Development Center
Ithaca—Daniel Duncan, Director

Northeast Research and Extension Center
Concord—John Witkowski, Director

Panhandle Research and Extension Center
Scottsbluff—Charles Hibberd, Director

South Central Research and Extension Center
Clay Center—Alan Baquet, Director

Southeast Research and Extension Center
Lincoln—Randy Cantrell, Director

West Central Research and Extension Center
North Platte—Gary Hergert, Director

Interdisciplinary Centers

Biotechnology Center
Anne Vidaver, Director

Food Processing Center
Steve Taylor, Director

Center for Grassland Studies
Martin Massengale, Director

Great Plains Regional Center for Global Environmental Change
Shashi Verma, Director

Industrial Agricultural Products Center
Milford Hanna, Director

Center for Rural Community Revitalization and Development
John Allen, Director

Center for Sustainable Agricultural Systems
Chuck Francis, Director

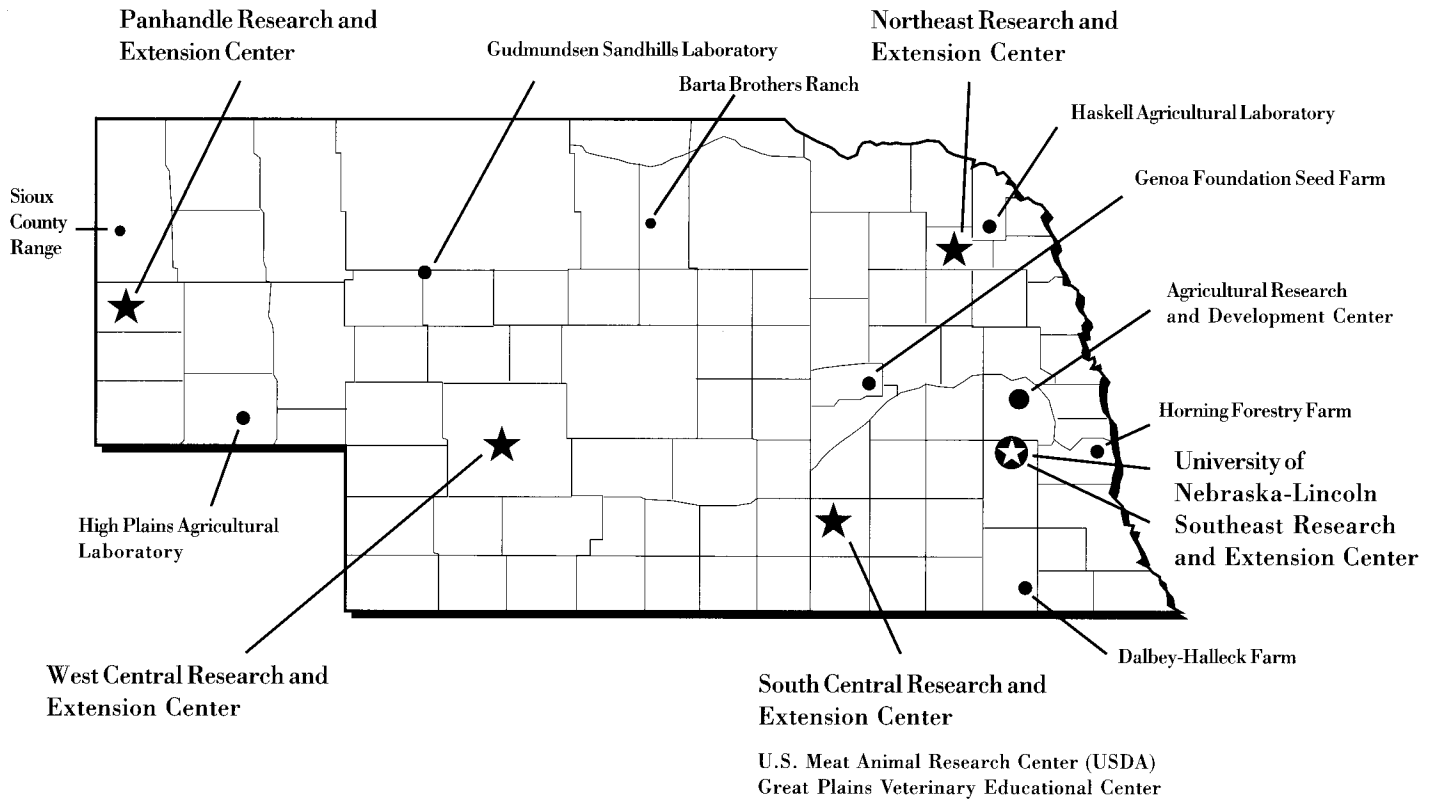
Water Center/ Environmental Programs
Edward Vitzthum, Interim Director

IANR Communications and Information Technology
Dan Cotton, Director

¹Ended appointment during 1999-2000

²Began appointment during 1999-2000

IANR Research Facilities



Research by Agricultural Research Division researchers is conducted across the state. Sites include:

- Agricultural Research and Development Center — Ithaca
- Barta Brothers Ranch — Long Pine
- Dalbey-Halleck Farm — Virginia
- Genoa Foundation Seed Farm — Genoa
- Gudmundsen Sandhills Laboratory — Whitman
- Haskell Agricultural Laboratory — Concord
- High Plains Agricultural Laboratory — Sidney
- Horning Forestry Farm — Plattsmouth
- Northeast Research and Extension Center — Norfolk
- Panhandle Research and Extension Center — Scottsbluff
- Sioux County Range — Mitchell
- South Central Research and Extension Center, Great Plains Veterinary Educational Center,
and the U.S. Meat Animal Research Center (USDA) — Clay Center
- Southeast Research and Extension Center — Lincoln
- West Central Research and Extension Center — North Platte

Approximately 334 faculty members have research appointments in ARD. Most have joint appointments, with teaching or extension responsibilities as well. Some faculty have responsibilities other than ARD research (rsch), extension (ext) or teaching (tch). Administrative appointments, as well as appointments with centers and other UNL units or with the USDA Agricultural Research Service (other), also are noted here.

The School of Natural Resource Sciences was formed in August 1997. The School was formed from the merger of the Department of Agricultural Meteorology, Department of Forestry, Fisheries and Wildlife and the Water Center/Environmental Programs. In addition, several faculty from other units within the University transferred all or part of their appointment to the School.

ARD programs depend on many linkages and cooperative arrangements in order to make the most effective use of limited resources and to address problems of mutual interest. The USDA Agricultural Research Service (ARS) has about 25 scientists located on the UNL campus. Historically there has been a very close working relationship between these scientists, all holding adjunct faculty status, and UNL faculty. Four departments contain ARS scientists: the Departments of Agronomy, Entomology, Plant Pathology and Biological Systems Engineering. ARS scientists are noted as USDA in the *other* category.

UNL scientists also cooperate closely with many ARS faculty at the Roman L. Hruska Meat Animal

Research Center (MARC) at Clay Center, Nebraska. There are about 50 scientists at the MARC facility, many of whom also hold UNL faculty status in the Department of Animal Science. MARC scientists are noted as USDA in the *other* category.

Another federal facility located on campus is the U.S. Forest Service National Agroforestry Center. USFS scientists also work closely with UNL faculty and hold adjunct faculty status. The Departments of Entomology and Forestry, Fisheries and Wildlife have adjunct faculty noted as USDA in the *other* category.

The USDA Natural Resources Conservation Service has personnel located in UNL facilities at the West Central Research and Extension Center, North Platte. The NRCS professional personnel there as well as those at the federal center, Lincoln, work closely with ARD faculty on a number of natural resources related activities.

The Department of Animal Science has a unique relationship with its industry supporters. Several industry representatives also hold adjunct appointments in the department and are noted as industry in the *other* category.

The percentages listed represent the proportion of a faculty member's time assigned to each function. The primary research responsibility is identified for each. All ARD off-campus personnel who are located at Centers are associated with an on-campus department as well [Department/(Area of Responsibility)]. Faculty rank and assignment percentages are based on the fiscal year 1999-2000 departmental budgets.

Agricultural/Natural Resources Units

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Agricultural Economics						
Jeffrey S. Royer ³	Professor	0.52	0.18	0.30		Head
John C. Allen	Professor	0.50	0.35	0.08	0.07	Director, Center for Rural Community, Revitalization and Development; Rural Sociology
J. David Aiken	Professor	0.45	0.25	0.30		Agricultural and Natural Resources Law
Azzeddine Azzam	Professor	0.70		0.30		Research and Quantitative Methods, Industrial Organization of Food Processing
Maurice E. Baker ¹	Professor	0.20		0.80		Natural Resource Economics
Oscar Burt	Adjunct Professor					Agricultural Production Economics, Natural Resources, Econometrics and Dynamic Optimization
Dennis Conley	Professor	0.45		0.55		Agribusiness
Sam M. Cordes	Professor	0.40	0.60			Rural Health Policy
Lilyan Fulginiti	Associate Professor	0.75		0.25		Agricultural Policies/Production
Konstantinos Giannakas ²	Assistant Professor	0.75		0.25		Food and Agribusiness Marketing
Glenn A. Helmers	Professor	0.60		0.40		Farm Management, Agricultural Finance Policy
Bruce B. Johnson	Professor	0.45		0.55		Resource and Community Economics
H. Douglas Jose	Professor	0.20	0.80			Farm and Ranch Management, Agricultural Finance Policy
Bettina Klaus	Assistant Professor	0.25			0.75	Microeconomic Theory
Gary Lynne ⁴	Professor	0.75		0.25		Natural Resource Economics
Richard Perrin	Professor	0.75		0.25		Production Economics
E. Wesley F. Peterson	Professor	0.75		0.25		International Trade, Development and Policy
George H. Pfeiffer	Associate Professor	0.25		0.75		Farm and Ranch Management
Raymond J. Supalla	Professor	0.75		0.25		Natural Resource Economics

Agricultural Leadership, Education and Communication

Earl B. Russell	Professor	0.20	0.15	0.65		Head, Distance Education Policy
Susan Fritz ²	Associate Professor	0.25		0.75		Leadership Development
John E. Barbuto, Jr.	Assistant Professor	0.25	0.25	0.50		Leadership Development
O.S. Gilbertson ¹	Professor	0.25	0.15	0.60		Agricultural Literacy
James W. King	Associate Professor	0.25		0.75		Distance Education
S. Kay Rockwell	Professor	0.25	0.60		0.07	Distance Education Policy

¹Ended research appointment during 1999-2000

²Began research appointment during 1999-2000

³Began head position during 1999-2000

⁴Ended head position during 1999-2000

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Agronomy						
Kenneth G. Cassman	Professor	0.55	0.25	0.20		Head
Bruce E. Anderson	Professor	0.25	0.75			Forage Management
Timothy J. Arkebauer	Associate Professor	0.85		0.15		Crop Environmental Physiology
P. Stephen Baenziger	Professor	0.75		0.25		Small Grains Breeding and Genetics
Robert M. Caldwell	Assistant Professor	0.40	0.60			Cropping Systems Specialist
Max Clegg	Associate Professor	0.75	0.25			Crop Physiology/K-12 Coordinator
Thomas Clemente ²	Assistant Professor	0.50		0.10	0.40	Plant Transformation Specialist
Achim Dobermann ²	Associate Professor	0.70	0.30			Soil Fertility/Nutrient Management
John W. Doran	Professor				USDA	Soil Biochemistry
Rhae A. Drijber	Associate Professor	0.60		0.40		Soil Microbiology Ecology
Ismail Dweikat ²	Assistant Professor	0.80		0.20		Sorghum Geneticist
Jerry D. Eastin	Professor	0.85	0.15			Crop Physiology
Charles A. Francis	Professor	0.48	0.48	0.04		Crop Production/ Director of the Center for Sustainable Agricultural Systems
Kulvinder Gill	Assistant Professor	0.80		0.20		Plant Molecular Cytogeneticist
George L. Graef	Professor	0.85		0.15		Soybean Breeding and Genetics
Robert Graybosch	Professor				USDA	Wheat Genetics
Donald J. Lee	Associate Professor	0.40		0.60		Plant Genetics
David T. Lewis ¹	Professor			0.40	0.60	Soil Genesis and Classification
John Lindquist	Assistant Professor	0.80		0.20		Weed Ecophysicologist
Sally Mackenzie ²	Professor	0.50		0.10	0.40	Plant Geneticist/Program Leader, Plant Science Initiative
Martha Mamo ²	Assistant Professor	0.25		0.75		Soil Chemistry/Biochemistry
Jerry Maranville	Professor	0.85		0.15		Sorghum Physiology
John P. Markwell	Professor	0.20			0.80	Plant Biochemist
Alexander Martin	Professor	0.33	0.67			Weed Science, Extension Coordinator
Stephen C. Mason	Professor	0.50		0.50		Crop Production
Martin A. Massengale	Professor	0.37	0.19	0.19	0.25	Grassland Forages/Director of the Center for Grassland Studies
Robert A. Masters	Professor				USDA	Range Weed Control
Dennis McCallister	Associate Professor	0.40		0.60		Soil Chemistry
David A. Mortensen	Professor	0.75		0.25		Weed Science
Lowell E. Moser	Professor	0.35		0.65		Forage Physiology
Lenis A. Nelson	Professor	0.50		0.50		Crop Variety Evaluation/New Crops
Jeffrey Pedersen	Professor				USDA	Sorghum Genetics and Breeding
William L. Powers	Professor	0.88		0.12		Soil Physics
W. Ken Russell	Assistant Professor	0.80		0.20		Plant Quantitative Genetics/Statistical Genomics
Walter H. Schacht	Associate Professor	0.60		0.40		Range Science
James S. Schepers	Professor				USDA	Soil Chemistry
John Shananan	Assistant Professor				USDA	Crop Physiology
David R. Shelton ¹	Associate Professor	0.80	0.20			Cereal Chemist
James E. Specht	Professor	0.80		0.20		Soybean Physiology and Breeding
Paul E. Staswick	Professor	0.85		0.15		Molecular Genetics
James Stubbendieck	Professor	0.25		0.25	0.50	Range Ecology/ Management/Director of the Center for Great Plains Studies
Gary E. Varvel	Associate Professor				USDA	Soil Management
Kenneth P. Vogel	Professor				USDA	Grass Breeding
Daniel T. Walters	Professor	0.60		0.40		Soil Management
J. Troy Weeks	Assistant Professor				USDA	Sorghum Molecular Biology
Brian Wienhold	Assistant Professor				USDA	Soil Fertility
Wallace W. Wilhelm	Professor				USDA	Crop Physiology

¹Ended research appointment during 1999-2000

²Began research appointment during 1999-2000

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Animal Science						
Donald H. Beermann	Professor	0.35	0.34	0.31		Head
Mary M. Beck	Professor	0.70		0.30		Poultry Physiology
Gary L. Bennett	Professor				USDA	Systems
Dennis R. Brink	Professor	0.30		0.70		Ruminant Nutrition
Chris R. Calkins	Professor	0.70		0.30		Meats
Ronald K. Christenson	Professor				USDA	Physiology
Edgar T. Clemens	Professor	0.50		0.50		Gastroenteric Physiology
L. Davis Clements	Professor	0.18	0.07		0.75	Meat and Poultry By-products
Larry V. Cundiff	Professor				Acad	Beef Genetics
Michael J. D'Occhio	Professor				USDA	Physiology
Calvin L. Ferrell	Professor				USDA	Nutrition
J. Joe Ford	Professor				USDA	Physiology
Richard J. Grant	Associate Professor	0.70	0.30			Dairy Nutrition
H. Edward Grotjan, Jr. ¹	Professor	0.15			Industry	Physiology
Thomas G. Jenkins	Professor				USDA	Genetics
Rodger K. Johnson	Professor	0.60		0.40		Swine Genetics
Steven J. Jones	Associate Professor	0.35		0.65		Meats
Jeffrey F. Keown	Professor	0.30	0.70			Dairy Management
Roger J. Kittok	Associate Professor	0.85		0.15		Reproductive Physiology
Terry J. Klopfenstein	Professor	0.70		0.30		Ruminant Nutrition
Richard K. Koelsch	Assistant Professor	0.09	0.21		0.70	Livestock Waste Management
Mohammad Koohmaraie	Associate Professor				USDA	Meats
Larry L. Larson	Associate Professor	0.40		0.60		Dairy Physiology
Dan B. Laster ¹	Professor				USDA	Reproductive Physiology
Austin J. Lewis	Professor	0.70		0.30		Swine Nutrition
Kreg A. Leymaster	Professor				USDA	Genetics
Donald D. Lunstra	Professor				USDA	Physiology
Roger W. Mandigo	Professor	0.60		0.40		Meats
Phillip S. Miller	Associate Professor	0.60		0.40		Swine Nutrition
C. Todd Milton ¹	Assistant Professor	0.50	0.40	0.10		Feedlot Nutrition
Jess L. Miner	Assistant Professor	0.70		0.30		Nutritional Biochemistry
Mark Morrison ¹	Associate Professor	0.75		0.25		Rumen Microbiology
Merlyn K. Nielsen	Professor	0.60		0.40		Genetics
J. Calvin Parrott, III	Professor				Industry	Ruminant Nutrition
Jerome C. Pekas	Associate Professor				USDA	Nutrition
Daniel H. Pomp	Associate Professor	0.75		0.25		Genetics
Rick J. Rasby	Professor	0.25	0.75			Beef Management
Thomas A. Rathje	Assistant Professor				Industry	Swine Genetics
Andrew J. Roberts	Assistant Professor				USDA	Physiology
Gary A. Rohrer	Assistant Professor				USDA	Genetics
Sheila E. Scheideler	Professor	0.45	0.50	0.05		Poultry Management
L. Dale Van Vleck	Professor	0.05		0.15	USDA	Genetics
Vincent H. Varel	Associate Professor				USDA	Bacterial Physiology
Jong-Tseng Yen	Professor				USDA	Nutrition
Dwane R. Zimmerman ¹	Professor	0.50		0.50		Swine Physiology

¹Ended research appointment during 1999-2000

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Biochemistry						
Robert V. Klucas	Professor	0.75		0.25		Head, Nitrogen Fixation
Lori A. Allison	Assistant Professor	0.80		0.20		Plant Molecular Genetics
Ruma V. Banerjee	Associate Professor	0.85		0.15		Mechanistic Enzymology
Xin Bi ²	Assistant Professor	0.80		0.20		Regulating Gene Expressions
Raymond Chollet	Professor	0.80		0.20		Photosynthesis
Vadim N. Gladyshev	Assistant Professor	0.80		0.20		Protein Biochemistry, Selenium
Herman W. Knoche	Professor	0.40		0.40		Lipid Biochemistry
John P. Markwell	Professor	0.60		0.20	0.20	Plant Biochemistry
Carolyn Price	Associate Professor	0.25			0.75	Biochemistry
Stephen W. Ragsdale	Professor	0.85		0.15		Enzymes
Gautam Sarath	Associate Professor	1.00				Protein Biochemistry
Robert J. Spreitzer	Professor	0.85		0.15		Plant Molecular Genetics
Donald P. Weeks	Professor	0.55		0.10	0.35	Plant Molecular Biology
Charles Wood	Professor	0.25			0.75	Virology
Biological Systems Engineering						
Glenn J. Hoffman	Professor	0.35	0.50	0.15		Head
Leonard L. Bashford	Professor	0.41		0.30	0.29	Tractors and Design Engineering
David Billesbach ²	Assistant Professor	1.0				
Rhonda M. Brand	Assistant Professor	0.50		0.50		Environmental Health Engineer
Tami Brown-Brandl	Assistant Professor				USDA	Animal Environmental and Waste Management
L. Davis Clements	Professor	0.37	0.13		0.50	Meat and Poultry By-products
Roger Eigenberg	Assistant Professor				USDA	Animal Environmental and Waste Management
Dean E. Eisenhauer	Professor	0.50		0.50		Hydrologic and Irrigation
Thomas G. Franti	Assistant Professor	0.25	0.75			Surface Water Management
Aris Gennadios	Assistant Professor				Industry	Pharmaceutical Manufacturing
John E. Gilley	Associate Professor				USDA	Soil Erosion
Robert D. Grisso	Professor	0.25	0.35	0.40		Agricultural Machinery
Milford A. Hanna	Professor	0.45		0.10	0.45	Food and Bioprocess Engineering
Terry A. Howell	Professor				USDA	Irrigation Scheduling
David D. Jones	Associate Professor	0.35		0.65		Product Handling and Storage
Michael F. Kocher	Associate Professor	0.40		0.60		Controls Engineer
Richard Koelsch	Assistant Professor	0.21	0.49		0.30	Livestock Bioenvironmental Engineering
Derrel L. Martin	Associate Professor	0.65		0.35		Sprinkler Irrigation
Michael M. Meagher	Associate Professor			0.20	0.80	Bioprocess Engineering
George E. Meyer	Professor	0.60		0.40		Plant Growth Modeling
Jack A. Nienaber	Professor				USDA	Animal Calorimetry
Mark Schrock	Professor				USDA	Agricultural Machinery
Dennis D. Schulte	Professor	0.50		0.50		Pollution Control and Energy Systems
LaVerne Stetson	Professor				USDA	Agricultural Electricity
Darrell Watts	Professor	0.50	0.30			Water Quality/Irrigation
Curtis L. Weller	Associate Professor	0.60		0.20	0.20	Food and Bioprocess Engineering
Wayne Woldt	Associate Professor	0.25	0.50		0.25	Bioenvironmental Engineering
Brian Woodbury	Assistant Professor				USDA	Animal Environmental and Waste Management

²Began research appointment during 1999-2000

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Biometry						
David B. Marx	Professor	0.50		0.50		Head, Statistical Consultant
Erin Blankenship ²	Assistant Professor	0.55		0.44		Statistical Consultant
Kent Eskridge	Associate Professor	0.60		0.40		Statistical Consultant
Stephen D. Kachman	Assistant Professor	0.75		0.25		Statistical Consultant
Anne Parkhurst	Professor	0.50		0.50		Statistical Consultant
Walter W. Stroup	Professor	0.50		0.50		Statistical Consultant
Linda J. Young	Professor	0.75		0.25		Statistical Consultant

Entomology

Z B Mayo	Professor	0.62	0.29	0.09		Head, Aphid Genetics
Frederick P. Baxendale	Professor	0.25	0.75			Turf Insects
Dennis R. Berkebile	Assistant Professor				USDA	Livestock Entomology
Stephen D. Danielson	Associate Professor	0.75		0.25		Forage Insects
Mary Ellen Dix	Associate Professor				USDA	Shelterbelt Insects
John E. Foster	Professor	0.50	0.50			Insect Genetics
E.A. Heinrichs	Professor				1.00	Insect-Plant Interactions
Leon G. Higley	Professor	0.80		0.20		Insect Ecology
W. Wyatt Hoback ²	Assistant Professor				1.00	Insect Ecology and Physiology
Scott Hutchins	Professor				1.00	Integrated Pest Management
Wayne L. Kramer	Assistant Professor				1.00	Medical Entomology
Lance J. Meinke	Professor	0.80		0.20		Soil Insects
Daniel Mollenbeck	Assistant Professor				1.00	Plant Resistance to Insects
Frank Peairs	Professor				1.00	Insect-Plant Interactions
Richard D. Peterson	Assistant Professor				USDA	Livestock Entomology
Robert K. Peterson	Associate Professor				1.00	Integrated Pest Management
Blair D. Siegfried	Professor	0.80		0.20		Insect Toxicology
Steven R. Skoda	Associate Professor				USDA	Livestock Entomology
C. Michael Smith	Professor				1.00	Plant/Insect Interactions
David W. Stanley	Professor	0.78		0.22		Insect Physiology
David B. Taylor	Associate Professor				USDA	Livestock Entomology
Gustave D. Thomas ¹	Professor				USDA	Livestock Entomology

¹Ended research appointment during 1999-2000

²Began research appointment during 1999-2000

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Food Science and Technology						
Steve L. Taylor	Professor	0.40	0.34	0.26		Head, Food Toxicology
Andrew K. Benson	Assistant Professor	0.60		0.40		Food Microbiology
Mindy M. Brashears	Assistant Professor	0.30	0.70			Food Microbiology
Lloyd B. Bullerman	Professor	0.70	0.10	0.20		Food Microbiology/Mycology
Susan B. Cuppett	Professor	0.60		0.40		Food Lipids
Milford A. Hanna	Professor	0.20			0.80	Food and Bioprocess Engineering
Susan Hefle	Assistant Professor	1.00				Food Allergy Research
Robert W. Hutkins	Associate Professor	0.65	0.35			Food Biotechnology
David S. Jackson	Associate Professor	0.70	0.30			Cereals/Oilseeds Processing
Jing-Liung Ju ¹	Assistant Professor	1.00				Food Safety Microbiology
Michael M. Meagher ¹	Associate Professor	0.80			0.20	Food Engineering
Shelly McKee-Hensarling	Assistant Professor	0.70	0.15	0.15		Egg and Egg Products
Vicki Schlegel ²	Assistant Professor	0.90		0.10		Quality Assurance
Durward A. Smith	Associate Professor	0.25	0.60	0.15		Horticultural Food Crops Processing
Randy L. Wehling	Professor	0.50		0.50		Food Analysis
Curtis L. Weller	Professor			0.20	0.80	Food and Bioprocess Engineering
Michael G. Zeece	Professor	0.75		0.25		Food Protein Chemistry

Horticulture

David T. Lewis ¹	Professor	0.26	0.14	0.20	0.40	Head
Garald L. Horst ^{3,4}	Professor	0.75		0.25		Interim Head, Turfgrass Physiology and Management
Dermot P. Coyne	Professor	0.96		0.04		Vegetable Breeding
Gregory L. Davis ¹	Assistant Professor	0.60		0.40		Sustainable Landscape
Roch E. Gaussoin	Associate Professor	0.25	0.75			Turfgrass Management and Physiology
Laurie Hodges	Associate Professor	0.25	0.75			Vegetable Production and Development
Ellen T. Paparozzi	Professor	0.50		0.50		Ornamentals
Terrance P. Riordan	Professor	0.65	0.15	0.20		Turf Breeding
Paul E. Read	Professor	0.50	0.25	0.25		Plant Tissue Culture and Viticulture
Robert C. Shearman	Professor	0.70	0.30			Sustainable Turf Systems
Durward A. Smith ¹	Associate Professor	0.18	0.27		0.55	Horticultural Food Crops Processing

IANR Communications and Information Technology

Dan Cotton	Administrator				1.00	Director
James K. Randall	Professor	0.05	0.80	0.15		Electronic Media

¹Ended research appointment during 1999-2000

²Began research appointment during 1999-2000

³Began interim head appointment during 1999-2000

⁴Ended interim head appointment during 1999-2000

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Plant Pathology						
Anne K. Vidaver	Professor	0.75	0.15	0.10		Head
Martin B. Dickman	Professor	0.85		0.15		Genetics of Host/Parasite Interactions
Roy C. French	Professor				USDA	Viruses and Nucleic Acids
Stanley G. Jensen ¹	Associate Professor				USDA	Corn and Sorghum Diseases
Leslie C. Lane	Associate Professor	0.85		0.15		Virus Diseases
Amit Mitra	Associate Professor	1.00				Plant Vector/Plant Transformation
James E. Partridge	Associate Professor	0.50		0.50		Host/Parasite Interactions/Stress
Thomas O. Powers	Associate Professor	0.80		0.20		Nematology
James R. Steadman	Professor	0.90		0.10		Epidemiology of Vegetable Diseases
Drake C. Stenger	Assistant Professor				USDA	Wheat Virology
James L. Van Etten	Professor	0.90		0.10		Molecular Virology
John E. Watkins	Professor	0.25	0.75			Small Grains, Turf and Alfalfa
Gary Y. Yuen	Associate Professor	0.85		0.15		Soilborne Diseases

School of Natural Resource Sciences

Edward T. Elliott ³	Professor	0.20			0.80	Director/Agricultural Meteorology
Blaine L. Blad ⁴	Professor	0.80	0.10	0.10		Director
James R. Brandle	Professor	0.70		0.30		Forestry\Windbreaks
Ronald M. Case	Professor	0.25		0.75		Wildlife
Xun-Hong Chen	Associate Professor	0.25		0.08	0.67	Hydrogeology
Steven D. Comfort	Associate Professor	0.75	0.25			Soil Environmental Chemist
Anatoly A. Gitelson ²	Professor	0.50		0.25	0.25	Remote Sensing
David C. Gosselin	Associate Professor	0.65		0.10	0.25	Earth Science
Mark O. Harrell	Professor	0.25			0.75	Forest Entomology
F. Edward Harvey	Assistant Professor	0.55		0.20	0.25	Hydrogeology
Michael J. Hayes	Assistant Professor	1.00				Agricultural Climatology
Gary L. Hergenrader	Professor	0.10	0.10	0.10	0.70	State Forester
Kyle D. Hoagland	Professor	0.75		0.25		Limnology
John Holtz ²	Assistant Professor	0.50	0.50			Limnology/Lake Management
Qi Hu ²	Assistant Professor	0.55	0.35	0.10		Agricultural Climatology
Kenneth G. Hubbard	Professor	0.70	0.20	0.10		Agricultural Climatology
Ron J. Johnson	Professor	0.31	0.69			Wildlife Management
Scott J. Josiah ²	Assistant Professor	0.25	0.75			Forestry
Shripat T. Kamble ¹	Professor	0.25	0.75			Pesticide Impact Assessment
Terrence B. Kayes ¹	Associate Professor	0.25	0.75			Aquaculture
Robert D. Kuzelka	Associate Professor	0.35	0.35	0.30		Assistant Director, Water Center/ Environmental Programs
Glen E. Martin ²	Assistant Professor	1.00				Water Science
James W. Merchant	Professor	0.25		0.25	0.60	Geographic Information Systems
Steve J. Meyer	Associate Professor	0.25	0.50	0.25		Agricultural Climatology
Darryll T. Pederson ¹	Professor	0.50			0.50	Geology
Edward J. Peters	Professor	0.25		0.75		Fisheries
Donald C. Rundquist	Professor	0.25		0.35	0.40	Remote Sensing

¹Ended research appointment during 1999-2000

²Began research appointment during 1999-2000

³Began director position during 1999-2000

⁴Ended director position during 1999-2000

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
School of Natural Resource Sciences (continued)						
Julie A. Savidge ¹	Associate Professor	0.40		0.60		Wildlife
Michele M. Schoeneberger	Assistant Professor				USDA	Forestry
Patrick J. Shea	Professor	0.80		0.20		Environmental Chemistry of Xenobiotics
Joseph M. Skopp ²	Associate Professor	0.50		0.50		Soil Physics
Daniel D. Snow ²	Assistant Professor	1.00				Hydrogeochemistry
Mary E. Spalding	Professor	1.00				Water Quality
Roy F. Spalding	Professor	0.80		0.10		Hydrochemistry/Associate Director, Water Center/Environmental Programs
Shashi B. Verma	Professor	0.60		0.15	0.25	Agricultural Meteorology
Edward F. Vitzthum	Associate Professor	0.20	0.65	0.15		Coordinator, Environmental Programs
Elizabeth A. Walter-Shea	Associate Professor	0.85		0.15		Agricultural Meteorology/Solar Radiation
David A. Wedin	Assistant Professor	0.40		0.60		Ecology
Albert Weiss	Professor	0.70	0.15	0.15		Agricultural Meteorology
Donald A. Wilhite	Professor	0.90		0.10		Agricultural Climatology

Veterinary and Biomedical Sciences

John A. Schmitz	Professor	0.65	0.15	0.20		Head
Raul Barletta	Associate Professor	0.90		0.10		Molecular Biology
Jeffrey Cirillo	Assistant Professor	0.85		0.15		Infectious Diseases
Ruben O. Donis	Associate Professor	0.60	0.15		0.25	Molecular Virology
Alan R. Doster	Professor				1.00	Diagnostic Pathology
Gerald E. Duhamel	Associate Professor	0.80		0.10	0.10	Diagnostic/Research Pathology
Jeffrey Gray ¹	Assistant Professor	0.40		0.20	0.40	Veterinary Microbiologist
Dee Griffin	Associate Professor		0.30	0.50	0.20	Beef Cattle Medicine
Clinton J. Jones	Professor	0.90		0.10		Molecular Virology
Laura Hungerford	Associate Professor	0.60		0.40		Physiology
Clayton L. Kelling	Professor	0.85		0.15		Research Virology
Marjorie F. Lou	Professor	1.00				Research Biochemistry
Rodney A. Moxley	Professor	0.90		0.10		Diagnostic/Research Pathology
Fernando Osorio	Professor	0.60			0.40	Diagnostic/Research Virology
Douglas G. Rogers	Associate Professor				1.00	Diagnostic/Research Pathology
Gary P. Rupp	Professor	0.30		0.50	0.20	Director, GPVEC, Beef Cattle Medicine
Norman Schneider	Associate Professor		0.25	0.50	0.25	Toxicology
Gary Sherman	Assistant Professor	0.60		0.40		Veterinary Epidemiology
David Smith	Assistant Professor	0.25	0.75			Dairy and Beef Cattle Health
S. Srikumaran	Professor	0.85		0.15		Immunology
David Steffen	Associate Professor				1.00	Diagnostic Research Pathology
Eva Wallner-Pendleton	Associate Professor		0.60		0.40	Avian Pathology
Robert Wills	Assistant Professor	0.30	0.70			Swine Diseases

¹Ended research appointment during 1999-2000

²Began research appointment during 1999-2000

Rank		Rsch	Ext	Tch	Other	Area of Responsibility
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Human Resources and Family Sciences Departments

Family and Consumer Sciences

Julie M. Johnson ⁵	Professor				1.00	Interim Chair
Shirley Baugher ¹	Professor	0.37	0.11		0.52	Chair
Douglas A. Abbott	Professor	0.25		0.75		Youth at Risk
Richard Bischoff	Assistant Professor	0.25		0.25	0.50	Collaborative Health Care
E. Raedene Combs	Professor	0.25			0.75	Housing, Aged
Sheran Cramer	Associate Professor	0.25			0.75	Women/Economic Security
Rochelle Dalla	Assistant Professor	0.25			0.75	Migration
Elizabeth Davis	Associate Professor	0.25			0.75	Family Economics
John D. DeFrain	Professor	0.25	0.75			Youth at Risk
Carolyn Edwards	Professor	0.25			0.75	Cultural Diversity/Early Childhood
William Meredith ¹	Professor	0.18			0.82	Youth at Risk
Kathy Prochaska-Cue	Associate Professor	0.25	0.75			Family Management
Mary Ellen Rider	Assistant Professor	0.25	0.75			Consumer Health Policy
Pauline Davey Zeece	Professor	0.25			0.75	Child Care

Nutritional Science and Dietetics

Marilynn Schnepf	Professor	0.40	0.10		0.50	Chair
Julie A. Albrecht	Associate Professor	0.25	0.75			Food Safety
Timothy Carr	Associate Professor	0.50			0.50	Nutritional Biochemistry
Judy Driskell	Professor	0.50			0.50	Nutrition
Nancy M. Betts	Professor	0.50			0.50	Nutrition
Fayrene Hamouz	Associate Professor	0.20	0.15	0.15	0.50	Restaurant Management
Nancy M. Lewis	Associate Professor	0.44			0.56	Nutrition
Kaye Stanek	Associate Professor	0.25			0.75	Nutrition

Textiles, Clothing and Design

Patricia Cox Crews ³	Professor	0.25			0.75	Interim Chair, Textile Conservation and Science
Rita C. Kean ⁶	Professor	0.32	0.08		0.60	Chair, Merchandising
Joan Laughlin	Professor	0.07			0.93	Textile Sciences
Shirley M. Niemeyer	Professor	0.25	0.75			Environmental Issues
Lois Scheyer	Assistant Professor	0.50			0.50	Industrial Use of Agricultural Products

¹Ended research appointment during 1999-2000

²Began research appointment during 1999-2000

³Began interim chair appointment during 1999-2000

⁵Began interim chair appointment during 1999-2000

⁶Began interim dean appointment during 1999-2000

	Rank	Rsch	Ext	Tch	Other	Department (Area of Responsibility)
Off-Campus Research Centers						
Northeast Research and Extension Center						
John F. Witkowski	Professor	0.23	0.69		0.08	Director
Michael C. Brumm	Professor	0.50		0.50		Animal Science (Swine Production)
Thomas E. Hunt ²	Assistant Professor	0.50	0.50			Entomology (Entomologist)
Stevan Knezevic	Assistant Professor	0.50	0.50			Agronomy (Weed Science)
William L. Kranz	Assistant Professor	0.25		0.75		Biological Systems Engineering (Water Quality)
Terry L. Mader	Professor	0.50		0.50		Animal Science (Beef Cattle)
Charles A. Shapiro	Associate Professor	0.50		0.50		Agronomy (Soils and Crop Nutrition)
David P. Shelton	Professor	0.50		0.50		Biological Systems Engineering (Soil Conservation)

Panhandle Research and Extension Center

Charles A. Hibberd	Professor	0.42	0.50		0.08	Director
Burton A. Weichenthal	Professor	0.50		0.50		Animal Science (Beef Cattle)
David D. Baltensperger	Professor	0.75	0.25			Agronomy (Crop Breeding)
Jurg M. Blumenthal	Assistant Professor	0.50	0.50			Agronomy (Soil Fertility)
Dillon M. Feuz	Associate Professor	0.50	0.50			Agricultural Economics (Farm/Ranch Management)
Dale M. Grotelueschen	Professor	0.10	0.50		0.40	Veterinary and Biomedical Sciences (Diagnostic)
Bob Harveson ²	Assistant Professor	0.50	0.50			Plant Pathology
Gary L. Hein	Professor	0.50	0.50			Entomology (Entomology)
Drew J. Lyon	Associate Professor	0.50	0.50			Agronomy (Dryland Crops)
Alexander D. Pavlista	Associate Professor	0.25	0.75			Horticulture (Potatoes)
Patrick E. Reece	Associate Professor	0.50	0.50			Agronomy (Range and Forage)
Ivan G. Rush	Professor	0.25	0.75			Animal Science (Beef Cattle)
John A. Smith	Associate Professor	0.50	0.50			Biological Systems Engineering (Machinery Systems)
Robert G. Wilson	Professor	0.50	0.50			Agronomy (Weed Science)
C. Dean Yonts	Associate Professor	0.50	0.50			Biological Systems Engineering (Irrigation)

South Central Research and Extension Center

Alan Baquet	Professor	0.14	0.78		0.08	Director
Brian Benham	Assistant Professor	0.50	0.50			Biological Systems Engineering (Water Quality Management)
Roger Elmore	Professor	0.50	0.50			Agronomy (Crop Production)
Richard Ferguson	Professor	0.50	0.50			Agronomy (Soil Fertility)
Fred W. Roeth	Professor	0.50	0.50			Agronomy (Weed Control/Water Quality)
Roger Selley	Associate Professor	0.25	0.75			Agricultural Economics (Farm Management)
James Stack	Assistant Professor	0.50	0.50			Plant Pathology (Diseases)
Robert Wright	Professor	0.50	0.50			Entomology (Biological Control)

²Began research appointment during 1999-2000

	Rank	Rsch	Ext	Tch	Other	Department (Area of Responsibility)
Southeast Research and Extension Center						
Randy Cantrell	Professor	0.05	0.87	0.08		Director
West Central Research and Extension Center						
Gary W. Hergert	Professor	0.50	0.50			Director
Richard T. Clark	Professor	0.40	0.60			Interim Associate Director, Agricultural Economics (Farm and Ranch Management)
Don C. Adams	Professor	0.50	0.50			Animal Science (Range Cattle Nutrition)
John B. Campbell	Professor	0.50	0.50			Entomology (Livestock/Crops)
Gene H. Deutscher	Professor	0.28	0.72			Animal Science (Beef Cattle Reproduction)
Thomas Long ¹	Assistant Professor	0.50	0.50			Animal Science (Swine Genetics)
Dale T. Lindgren	Professor	0.50	0.50			Horticulture (Ornamentals)
Nancy Norton	Instructor	0.50	0.50			Agricultural Economics (Farm/Ranch Management)
Jerry Volesky	Assistant Professor	0.50	0.50			Agronomy (Range Management)
Gail A. Wicks	Professor	0.50	0.50			Agronomy (Ecofarming/Weeds)
Interdisciplinary Activities						
Water Center/Environmental Programs						
Edward F. Vitzthum	Associate Professor	0.20	0.65	0.15		Interim Director, Coordinator, Environmental Programs
Shripat T. Kamble ¹	Professor	0.25	0.75			Pesticide Impact Assessment
Robert D. Kuzelka	Associate Professor	0.35	0.35	0.30		Assistant Director
Roy F. Spalding	Professor	0.10			0.90	Associate Director
Agricultural Research Division						
Darrell W. Nelson	Professor	1.00				Dean and Director
Dale H. Vanderholm	Professor	0.75			0.25	Associate Dean and Director
Karen E. Craig ¹	Professor	0.12	0.13		0.75	Assistant Director
Steven S. Waller	Professor	0.50		0.50		Assistant Dean and Director; NCSARE Coordinator

¹Ended research appointment during 1999-2000

Visiting Scientists and Research Associates

The Agricultural Research Division hosted 39 visiting scientists and 65 research associates to the campus in 1999-2000. ARD research is complemented and enhanced by these collaborating scientists—it is through the sharing of knowledge and expertise that the field of science is advanced.

Visiting Scientists

Agronomy

Visiting Scientist: Fufa Hundera Birru
Country: Ethiopia
Expertise/Discipline: Plant breeding and germplasm evaluation of tef

Visiting Scientist: Hikmet Budak
Country: Turkey
Expertise/Discipline: Grain quality and plant breeding - wheat

Animal Science

Visiting Scientist: Gamal Elsaarawi
Country: Egypt
Expertise/Discipline: Poultry science

Visiting Scientist: Ehssan Elansary Abdel Hamid
Country: Egypt
Expertise/Discipline: Poultry science

Visiting Scientist: Ji-Woong Lee
Country: Korea
Expertise/Discipline: Animal genetics

Visiting Scientist: Xuehong Liu
Country: China
Expertise/Discipline: Animal genetics

Visiting Scientist: Namburi Singari
Country: India
Expertise/Discipline: Ruminant nutrition

Visiting Scientist: Gary Snowden
Country: United States/Montana
Expertise/Discipline: Animal genetics

Visiting Scientist: Ponwadee Sopannarath
Country: Thailand
Expertise/Discipline: Animal genetics

Visiting Scientist: Galal El-Sherbeny
Country: Egypt
Expertise/Discipline: Crosses in wheat breeding

Visiting Scientist: Mahnaz Jabeen
Country: Pakistan
Expertise/Discipline: Wheat breeding and genetics

Visiting Scientist: Ariovaldo Luchiari, Jr.
Country: Brazil
Expertise/Discipline: Precision agriculture, crop stress detection, and remote sensing

Visiting Scientist: Zhang Rui
Country: China
Expertise/Discipline: Nitrogen-use efficiency

Visiting Scientist: Wenchun Zhou
Country: China
Expertise/Discipline: Molecular genetics of wheat

Biochemistry

Visiting Scientist: Raul Arredondo-Peter
Country: Mexico
Expertise/Discipline: Plant biochemistry

Visiting Scientist: Fazoil Ataulakhanov
Country: Russia
Expertise/Discipline: Biophysics

Visiting Scientist: Andrew Blokin
Country: Russia
Expertise/Discipline: Cancer research

Visiting Scientist: Chris Chastain
Country: United States/Minnesota
Expertise/Discipline: Plant biochemistry and molecular biology

Visiting Scientist: Sylvie Coursol
Country: France
Expertise/Discipline: Plant cell and molecular biology

Visiting Scientist: Gloria Esquivel
Country: Portugal
Expertise/Discipline: Biochemistry

Visiting Scientist: Weiwei Gu
Country: China
Expertise/Discipline: Biophysics/spectroscopy

Visiting Scientist: Matthieu Jeanneau
Country: France
Expertise/Discipline: Plant biochemistry and molecular biology

Visiting Scientist: Ping-Chang Lin
Country: Taiwan
Expertise/Discipline: Biophysics/spectroscopy

Visiting Scientist: Hamakwa Mantina
Country: Zambia
Expertise/Discipline: Public health

Visiting Scientist: Victor Vitvitsky
Country: Russia
Expertise/Discipline: Metabolic biochemistry

Entomology

Visiting Scientist: Mahmoud Ali
Country: Egypt
Expertise/Discipline: Apiculture

Visiting Scientist: Samira S. El Shall
Country: Egypt
Expertise/Discipline: Radiation sterility

Visiting Scientist: José Waquil
Country: Brazil
Expertise/Discipline: Host plant resistance, integrated pest management

School of Natural Resource Sciences

Visiting Scientist: Hesham M. Gaber
Country: Egypt
Expertise/Discipline: Soil chemistry and physics

Visiting Scientist: Zuoxing Liu
Country: China
Expertise/Discipline: Dry-land cropping and irrigation technology/agricultural meteorology

Visiting Scientist: Karin Rengefors
Country: United States (Woods Hole Oceanographic Institute)
Discipline: Phytoplankton ecology

Visiting Scientist: Valdir Schalch
Country: Brazil
Expertise/Discipline: Solid waste management

Visiting Scientist: Steve Schwartz
Country: United States/Oklahoma
Discipline: Aquatic ecology/zooplankton feeding

Visiting Scientist: Robert Sterner
Country: United States/Minnesota
Discipline: Limnology/food web interactions

Visiting Scientist: Stamatis Stamatiadis
Country: Greece
Expertise/Discipline: Environmental chemistry

Visiting Scientist: Zang-Kual Yu
Country: South Korea
Expertise/Discipline: Subtropical agriculture

Veterinary and Biomedical Sciences

Visiting Scientists: Reginaldo Bastos
Country: Brazil
Expertise/Discipline: Molecular bactereiology

Family and Consumer Sciences

Visiting Scientists: Di James
Country: Australia
Expertise/Discipline: Family issues

Visiting Scientists: Judy Geggie
Country: Australia
Expertise/Discipline: Family issues

Post-doctoral Research Associates

Agronomy

- Research Associate:* John Brejda
State/Country: Oklahoma, USA
Expertise/Discipline: Collection and evaluation of native legumes and forbs
- Research Associate:* Tony Buhr
State/Country: Nebraska, USA
Expertise/Discipline: Gene expression in transgenic soybean
- Research Associate:* Anita Dieleman
State/Country: Canada
Expertise/Discipline: Soil, topology, and pest site characterization data; herbicide treatment maps
- Research Associate:* Daniel Ginting
State/Country: Minnesota, USA
Expertise/Discipline: Site-specific manure application
- Research Associate:* Julie Huddle
State/Country: Texas, USA
Expertise/Discipline: Long-term vegetation in the Nebraska Sandhills; blowout penstemon
- Research Associate:* Anabayan Kessavalou
State/Country: India
Expertise/Discipline: Site-specific manure application
- Research Associate:* Gopal Krishnan
State/Country: India
Expertise/Discipline: Weed management in corn and soybeans
- Research Associate:* Won Jong Lee
State/Country: Korea
Expertise/Discipline: End-use quality of wheat/effects of environment on bread and noodle properties
- Research Associate:* Lijia Li
State/Country: China
Expertise/Discipline: Maize chromosome-specific libraries and probes
- Research Associate:* Mark Liebig
State/Country: Nebraska, USA
Expertise/Discipline: Evaluation of soil quality indicators on long-term cropping systems

Research Associate: Gilbert Meyer-Gauen
State/Country: Germany
Expertise/Discipline: Nuclear-mitochondrial genetic interactions

Research Associate: Chris Neeser
State/Country: Canada
Expertise/Discipline: Plant patch dynamics to address weed problems in agroecosystems

Research Associate: R.K. Pandey
State/Country: India
Expertise/Discipline: Cooperating with INTSORMIL on sorghum and nitrogen research

Research Associate: Brian Rector
State/Country: Georgia, USA
Expertise/Discipline: Genetic mapping of soybean traits

Research Associate: Mohammad Maroof Shah
State/Country: Pakistan
Expertise/Discipline: Wheat molecular cytogenetics

Animal Science

Research Associate: Alexandre Caetano
State/Country: California, USA
Expertise/Discipline: Animal genetics

Research Associate: Kari Elo
State/Country: Finland
Expertise/Discipline: Animal genetics

Research Associate: Nicolas Heng
State/Country: New Zealand
Expertise/Discipline: Molecular microbiology

Research Associate: Joao Luis Lopes da Costa Rocha
State/Country: Texas, USA
Expertise/Discipline: Animal genetics

Biochemistry

Research Associate: Mohammad M. Ahsan
State/Country: Bangladesh
Expertise/Discipline: Molecular genetics

Research Associate: Mohammad Anwaruzzaman
State/Country: Bangladesh
Expertise/Discipline: Biochemistry

<i>Research Associate:</i>	Sander Arendsen	<i>Research Associate:</i>	Tapan Kumar Kundu
<i>State/Country:</i>	The Netherlands	<i>State/Country:</i>	India
<i>Expertise/Discipline:</i>	Biochemistry	<i>Expertise/Discipline:</i>	Biophysics/spectroscopy
<i>Research Associate:</i>	Sarbani Chakraborty	<i>Research Associate:</i>	Shuhong Liu
<i>State/Country:</i>	Nebraska, USA	<i>State/Country:</i>	China
<i>Expertise/Discipline:</i>	Biochemistry	<i>Expertise/Discipline:</i>	Virology
<i>Research Associate:</i>	Sanchita Roy Chowdhury	<i>Research Associate:</i>	Nilesh Maiti
<i>State/Country:</i>	India	<i>State/Country:</i>	India
<i>Expertise/Discipline:</i>	Molecular biology	<i>Expertise/Discipline:</i>	Biochemistry
<i>Research Associate:</i>	Shantanu Chowdhury	<i>Research Associate:</i>	Eugene Mosharov
<i>State/Country:</i>	India	<i>State/Country:</i>	Russia
<i>Expertise/Discipline:</i>	Metallobiochemistry	<i>Expertise/Discipline:</i>	Biochemistry
<i>Research Associate:</i>	Long-Ying Dong	<i>Research Associate:</i>	Devendra Naidu
<i>State/Country:</i>	Japan	<i>State/Country:</i>	India
<i>Expertise/Discipline:</i>	Plant biochemistry and molecular biology	<i>Expertise/Discipline:</i>	Microbiology
<i>Research Associate:</i>	Qiujiang Du	<i>Research Associate:</i>	Mamta Naidu
<i>State/Country:</i>	China	<i>State/Country:</i>	India
<i>Expertise/Discipline:</i>	Molecular biology	<i>Expertise/Discipline:</i>	Molecular immunology
<i>Research Associate:</i>	Yu-Chun Du	<i>Research Associate:</i>	Kuljeet Singh
<i>State/Country:</i>	China	<i>State/Country:</i>	India
<i>Expertise/Discipline:</i>	Biochemistry	<i>Expertise/Discipline:</i>	Bioinorganic chemistry
<i>Research Associate:</i>	Natalia Ermolova	<i>Research Associate:</i>	Ming Tan
<i>State/Country:</i>	Russia	<i>State/Country:</i>	China
<i>Expertise/Discipline:</i>	Plant biochemistry	<i>Expertise/Discipline:</i>	Molecular biology
<i>Research Associate:</i>	Naduparambil K. Jacob	<i>Research Associate:</i>	Chao Wei
<i>State/Country:</i>	India	<i>State/Country:</i>	China
<i>Expertise/Discipline:</i>	Molecular biology	<i>Expertise/Discipline:</i>	Molecular biology
<i>Research Associate:</i>	Olga Komina	<i>Research Associate:</i>	Jianmin Wu
<i>State/Country:</i>	Russia	<i>State/Country:</i>	China
<i>Expertise/Discipline:</i>	Plant Biochemistry	<i>Expertise/Discipline:</i>	Molecular biology
<i>Research Associate:</i>	Boris Kornilav	<i>Research Associate:</i>	Youbin Xiang
<i>State/Country:</i>	Russia	<i>State/Country:</i>	China
<i>Expertise/Discipline:</i>	Biochemistry	<i>Expertise/Discipline:</i>	Molecular biology
<i>Research Associate:</i>	Konstantin Korotkov		
<i>State/Country:</i>	Russia		
<i>Expertise/Discipline:</i>	Biochemistry		
<i>Research Associate:</i>	Julya Krasotkina		
<i>State/Country:</i>	Russia		
<i>Expertise/Discipline:</i>	Enzymology		
<i>Research Associate:</i>	Sudha Krishna		
<i>State/Country:</i>	India		
<i>Expertise/Discipline:</i>	Microbiology		
		Entomology	
		<i>Research Associate:</i>	Michael Scharf
		<i>State/Country:</i>	Indiana, USA
		<i>Expertise/Discipline:</i>	Insecticide toxicology
		<i>Research Associate:</i>	Srinivas Parimi
		<i>State/Country:</i>	India
		<i>Expertise/Discipline:</i>	Insecticide toxicology

School of Natural Resource Sciences

Research Associate: Brian Cabrera
State/Country: California, USA
Expertise/Discipline: Termite biology

Research Associate: Xiaomao Lin
State/Country: Nebraska, USA
Expertise/Discipline: Instrumentation/meteorology

Research Associate: Rezaul Mahmood
State/Country: Oklahoma, USA
Expertise/Discipline: Modeling/climatology

Research Associate: Junhua Zhu
State/Country: Louisiana, USA
Expertise/Discipline: High pressure liquid chromatography - mass spectrometry

Research Associates: Mustapha Moulay Samrakandi
State/Country: France
Expertise/Discipline: Microbiology

Research Associates: Israrul Ansari
State/Country: India
Expertise/Discipline: Virology

Research Associates: Yunquan Jiang
State/Country: China
Expertise/Discipline: Molecular biology

Research Associates: Delin Liang
State/Country: China
Expertise/Discipline: Virology microbiology

Research Associates: Daniel Perez
State/Country: Nebraska, USA
Expertise/Discipline: Biochemistry

Research Associates: Xiaoli Liu
State/Country: China
Expertise/Discipline: Ophthalmology, cataract

Research Associates: Kostyantyn Krysan
State/Country: Ukraine
Expertise/Discipline: Molecular biology

Research Associates: Ventzislav B. Vassilev
State/Country: Russia
Expertise/Discipline: Molecular biology

Research Associates: Yang Zhang
State/Country: China
Expertise/Discipline: Molecular endocrinology

Veterinary and Biomedical Sciences

Research Associates: Ofelia Chacon
State/Country: Columbia
Expertise/Discipline: Pathobiology/microbiology - veterinary medicine

Research Associates: Emil Berberov
State/Country: Russia
Expertise/Discipline: Microbiology/genetics

Research Associates: Xiaoxing Cheng
State/Country: Switzerland
Expertise/Discipline: Microbial genetics/pathogenesis

Research Associates: Parmod K. Mehta
State/Country: India
Expertise/Discipline: Immunology

Research Projects

Each faculty member with an ARD appointment has a federally-approved research project. A number of faculty have multiple projects. There are 399 research projects that were active for all or part of the 1999-2000 fiscal year in agriculture, natural resources and family sciences. Projects are generally three to five years in duration. Faculty also are part of a national network of Agricultural Experiment Station scientists located at Land Grant Universities across the United States. ARD researchers currently are involved with about 56 regional projects in which they conduct cooperative research with

scientists at other universities, addressing problems of regional and national importance. They also participate in approximately 69 regional research committees which serve to exchange information and coordinate cooperative research activities among institutions.

Research projects are listed by departments. An asterisk (*) indicates that the project was discontinued in fiscal year 1999-2000.

You will note codes following the project number. The codes reveal the type of project.

<i>Type</i>	<i>Funding Source</i>	<i>Code</i>
Hatch	Federal and State Funds	ha
Regional Research	Federal Funds	rr
State	State Funds	st
McIntire-Stennis	Federal Funds	ms
Special Grant	Federal, State, Public and Private	sg
Competitive Grant	Federal Funds/USDA	cg
Animal Health	Federal Funds	ah

Hatch: research on all aspects of agriculture, including soil and water conservation and use; plant and animal production, protection, and health; processing, distributing, marketing, and utilization of food and agricultural products; forestry, including range products, multiple use of forest and rangelands, and urban forestry; aquaculture; family sciences, including human nutrition and family life; and rural and community development.

Regional Research: research in agriculture, natural resources and family sciences with regional importance and Nebraska application. Research is a collaborative effort with scientists from other land grant institutions and federal agencies.

State: research on all aspects of agriculture, natural resources, family sciences, and rural development that is supported entirely by state funds.

McIntire-Stennis: research relating to: 1) reforestation and management of land for the production of timber and other related products of the forest; 2) management of forest and related watershed lands to improve conditions of water flow and to protect resources against floods and erosion; 3) management of forest and related rangeland for production of forage for domestic livestock and game and improvement of food and habitat for wildlife; 4) management of forest lands for outdoor recreation; 5) protection of forest land and resources against fire, insects, diseases, or other destructive agents; 6) utilization of wood and other forest products; 7) development of sound policies for the management of forest lands and the harvesting and marketing of forest products; and 8) such other studies as may be necessary to obtain the fullest and most effective use of forest resources.

Special Grants: targeted research projects to address special needs for family sciences, agriculture, and the management of natural resources for Nebraska.

Competitive Grants: includes research in USDA national priority areas.

Animal Health: research to promote the general welfare through improved health and productivity of domestic livestock, poultry, aquatic animals, and other income-producing animals that are essential to the nation's food supply and the welfare of producers and consumers of animal products.

Agricultural/ Natural Resources Units

Agricultural Economics

10-106 rr
Private strategies, public policies, and food system performance (A.M. Azzam)

10-117 ha
Factors affecting the evolution of world agricultural markets: implications for U.S. policy (E.W.F. Peterson)

10-124 ha
Economic analysis of farm management and public policy alternatives for improving groundwater quality (R.J. Supalla, J.C. Allen)

10-125 ha
Impacts of policies related to water, commodity programs, and energy based inputs on Nebraska farms (G.A. Helmers, D.M. Conley, M.E. Baker)

10-126 rr
Impact analyses and decision strategies for agricultural research (R.K. Perrin)

10-130 ha
Technical efficiency analysis for livestock and dairy operations in Nebraska (A.M. Azzam, S.M. Azzam)

10-131 ha
Selected input markets in agriculture: fuels price risk and tractor demand (D.M. Conley)

10-132 rr
Water conservation, competition and quality in western irrigated agriculture (R.J. Supalla)

10-133 sg
Partnership for rural Nebraska (J.C. Allen, S.M. Cordes)

10-135 ha
Monitoring and analysis of farm real estate market developments in Nebraska (B.B. Johnson)

10-137 cg
Evaluation of the productivity environment tradeoff: a Great Plains case study (R.K. Perrin)

10-138 ha
Measurement and explanation of the competitiveness of the United States in the markets for beef, soy (L.E. Fulginiti)

10-139 **ha**
Rural sustainability: the relationship between community structure, agricultural structure and social class (J.C. Allen)

10-140 **ha**
The measurement of efficiency in resource use in rural areas: a stochastic frontier analysis (S.M. Cordes, A.M. Azzam, J.C. Allen)

10-142 **rr**
Competitiveness and value added in the U.S. grain and oilseed industry (D. Conley)

Agricultural Leadership, Education and Communication

*24-031 **st**
Impacting agricultural literacy of elementary students and teachers through teacher workshops (O.S. Gilbertson)

24-033 **st**
Distance education policy research: organization and administration (J.W. King, S.K. Rockwell, E.B. Russell)

24-034 **st**
Predictors of leader and follower behavior, and the impact of leadership development (J.E. Barbuto Jr., S. Fritze)

Agronomy

12-002 **ha**
Improvement and evaluation of oats and barley (P.S. Baenziger)

12-055 **ha**
Genetics, breeding and evaluation of common wheat and triticale for Nebraska (P.S. Baenziger)

12-149 **st**
Breeding sorghum and pearl millet for USA and developing countries (D.J. Andrews)

12-181 **ha**
Development of profitable reduced herbicide weed management systems through integration (A.R. Martin)

12-193 **ha**
Investigating alternative grain and oil crops for Nebraska (L.A. Nelson)

12-194 **ha**
Novel methods for soybean genetic improvement and genomic analysis (J.E. Specht)

12-197 **ha**
Tissue and cell physiology of sorghum (M.D. Clegg)

12-198 **ha**
Jasmonate regulated gene expression in soybean (P.E. Staswick)

12-201 **st**
Maintenance, increase and distribution of elite germplasm (R. Helsing)

12-202 **st**
Winter wheat germplasm enhancement and performance evaluation (C.J. Peterson, R.A. Graybosch)

12-204 **rr**
Biological and ecological basis for a weed management model to reduce herbicide use in corn (D.A. Mortensen, J.L. Lindquist)

12-215 **st**
Development of integrated weed management strategies to improve Great Plains and Midwest grasslands (R.A. Masters)

12-225 **ha**
Studies on the mechanisms found in corn, sorghum and pearl millet which improve N uptake and use (J.W. Maranville)

12-227 **st**
Perennial forage grass breeding for Nebraska (K.P. Vogel)

*12-235 **st**
Influence of novel and alien genes on the end-use quality of hard winter wheat (R.A. Graybosch)

12-238 **ha**
Management for sustained production of perennial warm-season grasses (W.L. Schacht)

12-241 **ha**
Ecological studies of Nebraska rangeland vegetation (J. Stubbendieck)

12-242 **st**
Defining and assessing basic indicators of soil quality and erodibility (J.W. Doran, J.E. Gilley, J.R. Ellis, G.E. Varvel)

12-243 **ha**
Weed distribution and demography: elucidating pest management principles for reducing herbicide use (D.A. Mortensen)

12-244 **ha**
Soil physical relationships for best management practices to protect water quality (W.L. Powers)

12-245 **st**
Development and assessment of integrated soil, water and crop management systems to control nitrate loading (J.R. Ellis, G.E. Varvel, W.W. Wilhelm, J.W. Doran, L.E. Stetson, J.S. Schepers)

*12-246 **st**
Efficient and environmentally sound conservation use of nutrients and C from animal manure (J.W. Doran, J.E. Gilley)

12-249 **st**
Integrated crop and soil management to improve nitrogen-use efficiency (W.W. Wilhelm, J.W. Doran, J.R. Ellis, G.E. Varvel, J.S. Schepers)

12-252 **ha**
Biosolids application and soil chemical properties: changes in phosphorus and carbon pools (D. McCallister)

12-253 **rr**
Characterizing nitrogen mineralization and availability in crop systems to protect water resources (D.H. Sander, D.T. Walters)

12-254 **ha**
Community structure and functional diversity of soil microbial communities in natural and agroecosystems (R.A. Drijver)

12-255 **ha**
Soybean breeding and genetic studies (G.E. Graef)

12-256 **cg**
Stability of soil microbial communities under different agroecosystems (R.A. Drijver)

12-258 **st**
Nutrient management for maximizing nutrient use efficiency in sorghum (J.W. Maranville)

12-259 **ha**
Assessment of genetic variation for end-use quality traits in soybean (D. Lee)

12-260 **ha**
Resource-efficient management of summer annual dryland cereal crops in Nebraska (S.C. Mason)

12-261 **st**
Cropping systems to optimize yield, water and nutrient use efficiency of pearl millet (S.C. Mason)

12-262 **sg**
The relevance of field-specific weed populations to performance of integrated weed management systems (D.A. Mortensen, J.A. Dieleman, A.R. Martin)

12-263 **cg**
Why weed patches persist: dynamics of edges and density (D.A. Mortensen, J.A. Dieleman)

12-264 **ha**
Herbage and livestock production from legume/grass pastures (B.E. Anderson)

12-265 **ha**
Molecular characterization and manipulation of the wheat genome for crop improvement (K.S. Gill)

12-266 **cg**
Effective use of carbon and nutrients in manure using site-specific application (B. Eghball, J.S. Schepers, C.A. Shapiro, R.B. Ferguson)

12-267 **ha**
Ecophysiology of corn - velvetleaf competition (J.L. Lindquist)

12-268 **ha**
Sustainable farms, landscapes and rural communities in Nebraska: an agricultural systems team approach (C.A. Francis)

12-269 **ha**
Cropping systems for uncertain environments: decision aids for managing soil and weather variability (R.M. Caldwell)

12-270 **cg**
Molecular characterization of a major gene cluster of wheat (K.S. Gill)

12-271 **sg**
IPM implementation in a corn/soybean/cotton/wheat system (D.A. Mortensen)

12-272 **ha**
Germination, growth, and development of selected perennial forage grasses (L.E. Moser)

12-273 **ha**
Selecting wheat and other cereal grains for enhanced end-use performance characteristics (D.R. Shelton, P.S. Baenziger, R.A. Graybosch)

12-274 **ha**
Physiological bases of environmental constraints on plant growth and productivity (T.J. Arkebauer)

12-275 **rr**
Marketing and delivery of quality cereals and oilseeds (D.R. Shelton)

12-276 **st**
Gene chips for economically important plants and animals (K. Gill, D. Pomp, K. Arumuganathan, P. Staswick)

12-277 **ha**
Quantitative genetics with focus on corn breeding and corn germplasm improvement (W.K. Russell)

12-278 **ha**
Dynamic nitrogen management strategies for optimizing maize yield and N use efficiency (D.T. Walters)

Animal Science

- 13-036 rr**
Management systems for improved decision making and profitability of dairy herds (R.J. Grant, H.D. Jose)
- 13-055 rr**
Biophysical models for poultry production systems (M.M. Beck)
- 13-086 ha**
Sustainable beef growing-finishing systems (T.J. Klopfenstein, T. Milton)
- 13-087 ah**
Relationship of subfunctional corpora lutea to frequency of LH pulses during the periovulatory period of cattle (J.E. Kinder)
- 13-096 rr**
Forage protein characterization and utilization for cattle (T.J. Klopfenstein, L.E. Moser)
- 13-101 ha**
Genetic variation for reproduction and energy utilization (M.K. Nielsen)
- 13-104 ha**
Optimizing the utilization of dietary fiber and lipids by dairy cows (R.J. Grant)
- 13-105 ha**
Nutrition of prolific sows (A.J. Lewis, P.S. Miller)
- 13-110 rr**
Molecular mechanisms regulating skeletal muscle growth and differentiation (S.J. Jones)
- 13-115 ha**
Evaluation of cow/calf weaning management systems to improve economic efficiency (R.J. Rasby, T.J. Klopfenstein, T. Milton, C.R. Calkins)
- *13-118 ha**
Factors affecting calcium transport in the avian small intestine and egg shell quality (S.S. Scheideler)
- *13-119 ha**
Nitrogen metabolism in *Prevotella ruminicola*: a molecular genetics approach (M. Morrison)
- *13-120 ha**
Testicular modulation of luteinizing hormone secretion (R.J. Kittok, J.E. Kinder, H.E. Grotjan)
- 13-122 ha**
Gastrointestinal structure and function as related to nutrition and body metabolism (E.T. Clemens)
- *13-123 ah**
Estrogen-calcium relationships during onset of metabolic bone disease in laying hens (M.M. Beck)

- 13-126 ha**
Physiological and management aspects of expression of estrus and ovulation rate in swine (D.R. Zimmerman)
- 13-127 ha**
Measurement and manipulation of carcass traits and influencing fresh meat value (C.R. Calkins)
- 13-128 ah**
Transfer of antibiotic resistance genes between bacteroides and *Prevotella* species (M. Morrison)
- 13-129 rr**
Positional and functional identification of economically important genes in the pig (D. Pomp)
- 13-130 ha**
Physiological and nutritional aspects of improving reproduction in dairy cattle (L.L. Larson)
- 13-131 cg**
Screening the pig genome for QTL controlling reproduction (D. Pomp, R.K. Johnson)
- *13-133 cg**
Molecular and kinetic analyses of the adherence of *Ruminococcus albus* B to cellulose (M. Morrison, R. Grant)
- 13-134 rr**
Integration of quantitative and molecular technologies for genetic improvement of pigs (R.K. Johnson, D. Pomp)
- 13-135 ha**
Recombinant bovine and equine gonadotropins (H.E. Grotjan)
- 13-136 cg**
Synthesis and assembly of cellulose binding proteins by *Ruminococcus albus* (M. Morrison)
- 13-137 cg**
Recombinant bovine gonadotropins (H.E. Grotjan, J.E. Kinder)
- 13-138 cg**
Molecular biology of protein degradation and utilization by *Prevotella ruminicola* (M. Morrison)
- 13-139 ha**
Regulation of gonadotropin synthesis and secretion, ovarian follicular development and testicular function pre- and post-puberty (J.E. Kinder)
- 13-140 ha**
Role of adipose tissue in determining energy utilization in cattle (J.L. Miner)
- 13-141 ha**
Nutritional management strategies for sustainable feedlot cattle production (T. Milton, T.J. Klopfenstein, T.L. Mader)

- 13-142 ha**
Value-added processed and manufactured meat products (R.W. Mandigo)
- 13-143 rr**
Enhancing the global competitiveness of U.S. red meat (C.R. Calkins, D.M. Feuz)
- 13-144 ha**
Utilization of phosphorus in cool- and warm-season grass hay by ruminants (D.R. Brink)
- 13-145 rr**
Genetic enhancement of health and survival for dairy cattle (J.F. Keown)
- 13-146 ha**
Factors affecting calcium utilization in the avian and egg shell quality (S.E. Scheideler)
- 13-147 ha**
Interrelationships among liver metabolism, nutrient intake, and growth criteria in growing-finishing barrows and gilts (P.S. Miller, A.J. Lewis)
- 13-148 ha**
Improving the efficiency of nitrogen and amino acid utilization by pigs (A.J. Lewis, P.S. Miller)
- 13-150 ha**
Control of luteinizing hormone secretion in male sheep (R.J. Kittok)
- 13-151 ah**
Estrogen-calcium relationships during onset of metabolic bone disease in the aging hen (M.M. Beck)

Biochemistry

- *15-070 st**
Development of dicamba-tolerant plants (D.P. Weeks, P.L. Herman)
- 15-073 rr**
Diversity and interaction of beneficial bacterial and fungi in the rhizosphere (R.V. Klucas)
- 15-076 ha**
Hemoglobins in higher plants (R.V. Klucas)
- 15-078 ha**
Genetic modification of chloroplast rubisco (R.J. Spreitzer)
- 15-080 ha**
Characterization of human telomerase (C.M. Price)
- 15-081 ha**
Symbiosome proteins from soybean root nodules (G. Sarath)
- 15-082 cg**
Rubisco phylogenetic correction (R.J. Spreitzer)

- 15-083 cg**
The role of a family of nuclear-encoded sigma factors in plastid transcription regulation (L.A. Allison)
- *15-084 st**
Redox control of biological activity (S.W. Ragsdale)
- 15-085 ha**
Regulation of transcription in plastids of higher plants (L.A. Allison)
- 15-086 ha**
B₁₂ enzymes and hyperhomocysteinemia (R. Banerjee)
- 15-087 rr**
Regulation of photosynthetic processes (R. Chollet, J.P. Markwell, R.J. Spreitzer)
- 15-088 ha**
Enzymology of anaerobic CO₂ fixation and bioremediation (S. Ragsdale)
- 15-089 cg**
Rubisco phylogenetic correction (R.J. Spreitzer)
- 15-090 ha**
Selenium-containing proteins (V.N. Gladyshev)
- 15-091 st**
Strategies for developing herbicide-tolerant crops (D.P. Weeks)
- 15-092 st**
Plant Proteomics (J.P. Markwell)

Biological Systems Engineering

- 11-001 st**
Evaluation of performance of new tractors (L.I. Leviticus)
- 11-044 rr**
Improvement of thermal processes for food (M.A. Hanna)
- 11-079 ha**
Agricultural tractor testing board: policies and procedures (L.L. Bashford, M.F. Kocher, R.D. Grisso)
- 11-097 ha**
Protein film production and evaluation (C.L. Weller)
- 11-099 ha**
Improving field productivity and predicting energy requirements of soil-engaging equipment (R.D. Grisso, M.F. Kocher, L.L. Bashford)
- 11-102 ha**
Identification, modeling, and design of plant sensor systems for variable-rate chemical application (G.E. Meyer)

- 11-103 **ha**
Managing atrazine runoff losses to improve surface water quality (T.G. Franti)
- 11-105 **st**
Safe and efficient use of electrical energy for irrigation, livestock, and poultry facilities (L. Stetson)
- 11-107 **ha**
Bovine rumen contents as a source of industrial enzymes and chemicals (L.D. Clements)
- *11-108 **sg**
Using army ammunition plants to process agricultural materials into industrial products (L.D. Clements)
- 11-109 **ha**
Whole farm nutrient balance for livestock production systems (R.K. Koelsch)
- 11-110 **ha**
Variability in metering devices used in site-specific crop management schemes (L.L. Bashford)
- *11-111 **st**
Characterization and modeling of odor emissions from animal production facilities (D.D. Schulte, S.B. Verma, D. Billesbach, R.K. Koelsch)
- 11-112 **ha**
Hydrologic modeling and engineering for enhancement of vegetative riparian buffers (D.E. Eisenhauer)
- 11-113 **ha**
Uptake and metabolic effects of pesticide combinations on mammalian systems (R.M. Brand)
- 11-114 **ha**
Consideration of imprecision in pollution prevention system engineering (W.E. Woldt)
- 11-115 **ha**
Improved anaerobic lagoon design and management for odor control (D.D. Schulte)
- 11-116 **ha**
Engineering problems of flow measurement and control in agricultural industries (M.F. Kocher)
- 11-117 **ha**
Application of fuzzy systems analysis in biological systems engineering (D.D. Jones)
- 11-118 **ha**
Development of simulation and optimization models for watershed management (D.L. Martin)

Biometry

- 23-001 **st**
Applications of statistics to research in agriculture (D.B. Marx, W.W. Stroup, A.M. Parkhurst, K. Eskridge)
- 23-002 **rr**
Stress factors of farm animals and their effects on performance (A.M. Parkhurst)
- 23-003 **st**
Innovative design and analysis of agricultural experiments (W.W. Stroup, E.T. Paparozzi)

Entomology

- *17-047 **rr**
Spatial dynamics of leafhopper pests and their management on alfalfa (S.D. Danielson)
- 17-054 **ha**
Biochemistry and physiology of lipids, prostaglandins and related eicosanoids in insects (D.W. Stanley)
- 17-061 **st**
Management of fly population densities in cattle feedlots to reduce adverse impacts (G.D. Thomas, J.J. Petersen, S.R. Skoda)
- 17-062 **ha**
Arthropods associated with buffalograss and other turfgrasses in Nebraska (F.P. Baxendale)
- *17-063 **ha**
Stress-cereal crop interactions and development of resistant cultivars (S.S. Quisenberry)
- 17-064 **ha**
Host-plant resistance, insect genetics, and biological studies of cereal insects (J.E. Foster)
- 17-067 **ha**
The influence of shelterbelts and alfalfa on natural enemies of the bean leaf beetle, *Cerotoma trifurcata* (Forster) in soybeans (S.D. Danielson)
- 17-068 **ha**
Mechanisms and management of arthropod injury to plants (L.G. Higley)
- *17-069 **cg**
Diagnostic techniques for monitoring Bt resistance in the European corn borer (B.D. Siegfried)
- 17-070 **ha**
Bio-intensive pest management of the greenbug (Z.B. Mayo)

- 17-071 **ha**
Development of resistance management techniques for corn insect pests in Nebraska (B.D. Siegfried)
- 17-072 **ha**
Ecology and management of Diabrotica species (L.J. Meinke)
- 17-073 **rr**
Dynamic soybean insect management for emerging agricultural technologies and variable environments (L.G. Higley)

Food Science and Technology

- 16-044 **rr**
Molecular mechanisms regulating skeletal muscle growth and differentiation (M.G. Zeece)
- 16-051 **ha**
Starch technology: production, characterization, and utilization (D.S. Jackson)
- 16-054 **ha**
Chemical and physical quality characteristics of horticultural crops and their products (D.A. Smith)
- 16-055 **ha**
Food allergies and sensitivities (S.L. Taylor, S.L. Hefle)
- 16-056 **ha**
Mold and mycotoxin hazards in foods, feeds and the environment (L.B. Bullerman)
- 16-065 **ha**
Genetics and physiology of *Streptococcus thermophilus* and other lactic acid bacteria (R.W. Hutkins)
- 16-066 **ha**
Analytical methods for food process control and measurement of processing induced changes (R.L. Wehling)
- *16-068 **cg**
Fate of fumonisin B₁ in heat processed corn products (L.B. Bullerman, M.A. Hanna)
- 16-069 **ha**
Role of proteolysis in myofibrillar/cytoskeleton structure and integrity (M.G. Zeece, S.L. Taylor)
- *16-070 **sg**
Alliance for food protection (S.L. Taylor)
- 16-071 **rr**
Enhancing food safety through control of foodborne disease agents (C.L. Weller)
- *16-075 **st**
Coupling of molecular recognition and signal generation in arrayed fluorescent hybridization assays (A.K. Benson)
- 16-076 **cg**
Detecting internal insect infestation in wheat by near-infrared spectroscopy (R.L. Wehling)
- 16-077 **ha**
Genetics and biochemistry of stress-response systems in gram-positive bacteria and foodborne pathogens (A.K. Benson)
- 16-078 **ha**
Evaluation and characterization of antioxidants from plant sources (S.L. Cuppett)
- 16-079 **st**
Mapping and site-directed mutagenesis of IgE epitopes in a food allergen from soybean (Gly m Bd 30k) (M.G. Zeece, J.P. Markwell, G. Sarath, D.E. Wylie)
- 16-080 **ha**
Competitive inhibition of food-borne pathogens in meat and poultry products and in cattle (M.M. Brashears)
- 16-081 **cg**
Genomic analysis of *E. coli* 0157:H7 populations from cattle and humans (A.K. Benson, R.W. Hutkins)
- 16-082 **rr**
Marketing and delivery of quality cereals and oilseeds (D.S. Jackson)
- 16-083 **rr**
Marketing and delivery of quality cereals and oilseeds (L.B. Bullerman)
- 16-084 **cg**
Extrusion processing as a means of reducing *fusarium* mycotoxins in cereal foods (L.B. Bullerman, M.A. Hanna, M.M. Castelo)
- 16-085 **sg**
CCP identification and validation during poultry production and processing (M.M. Brashears, S.R. McKee, E.A. Wallner-Pendleton)

Horticulture

- 20-040 **rr**
Genetic improvement of beans (*Phaseolus vulgaris* L.) and nutritional value for yield, pest resistance and nutritional value (D.P. Coyne, J.R. Steadman)
- 20-048 **ha**
Influence of sulfur and nitrogen on the growth and development of ornamental plants (E.T. Paparozzi)
- 20-050 **ha**
Cultural practices to minimize environmental stress on vegetable crop production and physiology (L. Hodges, J.R. Brandle)

***20-054 ha**
Establishment and management of turf-type buffalograsses (R.E. Gaussoin)

20-055 ha
Genetics and breeding of dry edible beans (*Phaseolus vulgaris* L.) with emphasis on multiple disease resistance (D.P. Coyne)

20-056 ha
Integrated turfgrass management practices (R.C. Shearman)

20-057 ha
Application of micropropagation and biotechnology to improvement and multiplication of horticultural crops (P.E. Read)

20-058 ha
Exudate physiology of grasses grown under stress environments (G.A. Horst)

20-059 ha
Factors affecting prairie forb and grass establishment: interference in sustainable landscape management (G.L. Davis)

20-060 ha
Breeding and development of buffalograss for the central great plains (T.P. Riordan)

20-061 st
Development of glyphosate resistant buffalograss (T.P. Riordan, T.E. Clemente, S. Fei, R.V. Klucas)

20-062 ha
Exploring plant nutrient interactions in floricultural and ornamental crops (E.T. Paparozzi)

20-063 ha
Growing and cultural practice impacts on USGA putting greens and their microbial communities (R.E. Gaussoin)

Plant Pathology

21-012 st
Electron microscopy in agricultural research (E.M. Ball)

21-022 rr
Biocontrol of soil-borne plant pathogens (G.Y. Yuen)

21-040 ha
DNA replication and gene expression of *Chlorella* viruses (J.L. VanEtten)

***21-041 ha**
Pathogenic determinants of phytopathogenic fungi (M.B. Dickman)

21-056 ha
Detection of seedborne bacteria and characterization of bacterial endophytes (A.K. Vidaver)

21-057 rr
Genetic variability in the cyst and root-knot nematodes (T.O. Powers)

21-058 rr
Overwinter survival of *Heterodera pratylenchus* and associated nematodes in the North Central Region (T.O. Powers, E.D. Kerr)

21-061 ha
Detection and properties of plant viruses of Nebraska with emphasis on sugar beet viruses (L.C. Lane)

21-063 ha
Biological control of soilborne diseases of legumes and turfgrass with antagonistic bacteria (G.Y. Yuen)

21-064 rr
Fusarium mycotoxins in cereal grains (M.B. Dickman)

***21-068 cg**
Molecular mechanism of fumonisin induced pathogenesis in chicken (M.B. Dickman)

21-069 ha
Leaf rust virulence in Nebraska and management systems for turfgrass diseases (J.E. Watkins)

21-070 ha
Mitigation of diseases of dry edible bean stem rot of soybean by managed plant resistance (J.R. Steadman)

21-071 cg
Entomopathogenic nematodes for biological control of filth flies in feedlots (T.O. Powers, A.L. Szalanski)

21-072 cg
Molecular analysis of sclerotial development in *Sclerotinia sclerotiorum* (J.A. Rollins)

21-073 ha
Environmental effects on plant host-parasite interactions (J.E. Partridge)

21-074 st
Broad-spectrum virus resistance in transgenic plants (A. Mitra)

21-075 ha
Application of PCR based approaches for nematode identification and epidemiology (T.O. Powers)

21-076 ha
Pathogenic determinants of phytopathogenic fungi (M.B. Dickman)

School of Natural Resource Sciences

12-209 ha
Procedures for assessing impacts of nonpoint agrichemicals on ground water (R.F. Spalding)

12-239 ha
Processes associated with long-term fate and detoxification of organonitrogen contaminants in soil (P.J. Shea)

***25-004 sg**
Nebraska participation in the national agricultural pesticide impact assessment program (S.T. Kamble)

26-025 ms
Biological and tree-injection methods for controlling tree pests (M.O. Harrell)

***26-026 ha**
Factors affecting wildlife diversity and the distribution of rare populations in Nebraska (J.A. Savidge)

26-027 ha
Integrating biological diversity into managed land-use systems (R.J. Johnson)

27-003 ha
Exchange of carbon dioxide and other atmospheric trace gases in vegetated ecosystems (S.B. Verma)

27-004 ha
Remotely sensed estimates of productivity, energy exchange processes and water stress in vegetation (B.L. Blad, E.A. Walter-Shea)

27-007 ha
Drought: response and policy implications (D.A. Wilhite)

27-008 rr
Climate and agricultural landscape productivity analysis and assessment in the North Central Region (K.G. Hubbard)

27-011 ha
Relationships between remotely-sensed spectral properties of vegetated surfaces and biophysical properties (E.A. Walter-Shea)

27-012 rr
NADP - A long term monitoring program in support of research on the effects of atmospheric chemical deposition (S.B. Verma)

27-016 ha
Climate change and the winter wheat agroecosystem: experiments and modeling (A. Weiss)

27-017 ha
Remodeling the surface energy budgets with a universal crop coefficient and natural variability specifications (K.G. Hubbard)

***30-003 sg**
Management of irrigated corn and soybeans to minimize ground water contamination (D.G. Watts)

***30-004 st**
Development of a biochemical approach to manage German cockroaches (S.T. Kamble, G. Sarath, G. Yuen, L. Young)

40-001 sg
Developing drought mitigation and preparedness technologies for the U.S. (D.A. Wilhite)

40-002 ha
Remediating organic contaminants in soil and water through natural and accelerated attenuation (S.D. Comfort)

40-003 ha
Effects of atrazine on algal communities in aquatic ecosystems in the midwest (K.D. Hoagland)

40-004 ha
Nebraska participation in the national agricultural pesticide impact assessment program (S.T. Kamble)

40-005 ha
Ecology of pallid sturgeon and associated fishes in the Platte River, Nebraska (E.J. Peters)

40-006 ms
Linking special forest products, markets and sustainable agroforestry systems (S.J. Josiah, J.R. Brandle)

40-007 ms
Consequences of woody species establishment in the Great Plains (D. Wedin)

40-008 ha
Interannual and interdecadal variation of precipitation and temperature in Nebraska and surrounding states (Q. Hu)

Veterinary and Biomedical Sciences

14-009 rr
Prevention and control of enteric diseases of swine (R.A. Moxley)

14-014 rr
Bovine respiratory disease (S. Srikumaran)

- 14-039 st
Research laboratory and animal care facility (J.A. Schmitz, A. Hogg, T.E. Socha)
- 14-059 st
Veterinary diagnostic lab system: diagnostic surveillance and disease investigation in Nebraska livestock and poultry (J.A. Schmitz, A.R. Doster, J.L. Johnson, D.M. Grotelueschen)
- *14-077 ah
Molecular genetics analysis of *Mycobacterium paratuberculosis* and related mycobacterial pathogens (R.G. Barletta)
- *14-078 ah
Role of group A bovine rotavirus P protein antigenic epitopes in immunity and infection (G.E. Duhamel)
- 14-085 rr
Research in support of a national eradication program for pseudorabies (F.A. Osorio)
- 14-086 cg
Molecular characterization of *Pasteurella haemolytica* leukotoxin-receptor interactions (S. Srikumaran)
- 14-091 cg
Molecular characterization of MHC class I down-regulation by bovine herpesvirus I (S. Srikumaran)
- *14-092 cg
The biology of persistent infections caused by porcine reproductive and respiratory virus (F.A. Osorio, A.R. Doster)
- 14-093 ah
Bovine respiratory syncytial virus glycoprotein interactions in a homologous host cell receptor (C. Kelling)
- 14-094 ah
Molecular characterization of animal RNA viruses and their interactions with the host (R.O. Donis)
- 14-095 ah
Interaction of porcine reproductive and respiratory syndrome virus and *Salmonella choleraesuis* (R.W. Wills, F.A. Osorio)
- 14-096 ah
Functional analysis of the BHV-1 latency related gene (C. Jones)
- 14-097 cg
Functional analysis of bovine herpes virus I latency related gene products (C. Jones)
- 14-098 st
Monitoring individual animal performance to evaluate beef cattle production and economics (G.P. Rupp, D.D. Griffin)

- 14-099 cg
Cis-acting elements in the replication of the bovine viral diarrhoea virus genome (R.O. Donis)
- 14-100 cg
Analysis of apoptosis and pathogenesis by bovine herpes virus and BICPO (C. Jones, A.R. Doster)
- 14-101 cg
Role of *E. coli* heat-labile enterotoxin-I in diarrhoea and septicemia in swine (R.A. Moxley, R.G. Barletta)
- 14-102 ha
Strategic plan for an IANR field disease research program at the Department of Veterinary and Biomedical Sciences (D.R. Smith)
- 14-103 ah
Pathogenic mechanisms of bacterial respiratory pathogens (J.D. Cirillo)
- 14-104 cg
Identification of mycobacterium paratuberculosis virulence determinants (R.G. Barletta)
- 14-105 cg
The effect of PRRSV on the immune system during acute and persistent infection (F.A. Osorio, F. Zuckerman, A.R. Doster)
- 14-106 cg
Genetic analysis of elements controlling bovine viral diarrhoea virus translation (R.O. Donis, C.L. Kelling)
- 14-107 ha
Theoretical and applied molecular biology or porcine gonadotropins (G.B. Shearman)
- 14-108 ah
Molecular genetic analysis of *Mycobacterium paratuberculosis* and related mycobacterial pathogens (R.G. Barletta)
- 14-109 ha
Epidemiology of *Escherichia coli* 0157:H7 and *salmonella* in feedlot beef cattle (D.R. Smith, R.A. Moxley, L.L. Hungerford, J.T. Gray, T.J. Klopfenstein)

Human Resources and Family Sciences Departments

Family and Consumer Sciences

- 92-020 rr
The role of housing in rural community vitality (E.R. Combs)
- 92-021 ha
Impact of Head Start on rural children, families, and communities (P.D. Zeece)
- 92-022 ha
Retirement economic well-being for women in Nebraska and cross-culturally (S.L. Cramer)
- 92-023 ha
Economic well-being of Nebraska household: a comparison of alternative measures (E.P. Davis)
- 92-025 ha
Family functioning of interracially constituted families (S. Baugher)
- 92-026 ha
Surviving and transcending a traumatic childhood (J.D. DeFrain)
- 92-028 ha
High hopes and bright futures: successful teens in Nebraska (D.A. Abbott, W.H. Meredith)
- 92-029 ha
The impact of welfare reform on women's lives: education, job placement/retention, and resource management (K. Prochaska-Cue, B. Sparks)
- 92-031 ha
Economic impact of HIV/AIDS on Nebraskans (M.E. Rider)
- 92-032 ha
The new relational perspective in developmental psychology and its applications to education and child care (C.P. Edwards)
- 92-033 ha
Into the heartland: a contextual examination of migration and its impacts on rural Nebraskan meat-packing communities (R.L. Dalla)
- *92-034 ha
Three cohorts of teenage mothers: regional comparisons and sex education (S.T. Russell)

- 92-035 rr
Rural low-income families: monitoring their well-being and functioning in the context of welfare reform (K. Prochaska-Cue)

Nutritional Science and Dietetics

- 91-042 rr
Bioavailability of nutrients: a key to human nutrition (J.A. Driskell)
- 91-043 rr
Health maintenance aspects of dietary recommendations designed to modify lipid metabolism (N.M. Lewis)
- *91-044 cg
Dietary trans fatty acid influence on atherosclerosis and sterol metabolism (T.P. Carr)
- 91-045 rr
Using stages of change model to promote consumption of grains, vegetables and fruits by young adults (N.M. Betts)
- 91-046 ha
Exercise dependence and disordered eating behaviors: instrument development validation and testing (N.M. Betts)
- 91-047 ha
The metabolic basis of atherosclerosis (T.P. Carr)
- 91-048 ha
The use of edible films and natural antioxidants to control warmed-over flavor in meats (M. Schnepf)
- 91-049 ha
Nutritional knowledge, practices, beliefs of caregivers and practices of physicians for young children (K.L. Stanek)
- 91-050 ha
Health implications of folate and homocysteine as it relates to fruit and vegetable consumption (J.A. Albrecht)
- 91-051 ha
Assessing managerial and work force development in foodservice management (F. Hamouz)

Textiles, Clothing and Design

- *94-019 rr
Assessment of the environmental compatibility of textile and other polymeric materials (P. Cox-Crews)

- *94-020 ha**
Situational and personal factors in residential waste management: the impacts of markets, resources, and attitudes (S.M. Niemeier)
- *94-021 rr**
Family business: interaction of work and family spheres (R.C. Kean)
- 94-022 ha**
Development of textile end-uses for wheat gluten and other farm commodity derived materials (L.E. Hamilton)
- 94-023 rr**
Development of textile materials for environmental compatibility and human health and safety (P.C. Crews)
- 94-024 ha**
Impacts of environmental disclosure policies and constraints on housing transaction practices (S. Niemeier)
- 94-025 rr**
Development of textile materials for environmental compatibility and human health and safety (L. Scheyer)

Off-Campus Research Centers

Northeast Research and Extension Center

- 42-007 ha**
Management considerations for feedlot cattle exposed to environmental stressors (T.L. Mader, C.T. Milton)
- 42-014 ha**
Biology and control of the European corn borer leaf beetle and other selected insects in northeast Nebraska (J.F. Witkowski)
- 42-017 ha**
Determination of crop residue cover using electronic image analysis (D.P. Shelton)
- 42-018 rr**
Integrated crop management effects on stalk-boring Lepidoptera (J.F. Witkowski)
- *42-020 ha**
Effects of preplant tillage and nitrogen application method on nitrate leaching (W.L. Kranz)

- *42-021 ha**
Development of integrated pest management techniques for improved weed management (D.L. Holshouser)
- 42-022 cg**
Dynamic responses of feedlot cattle exposed to heat stress (T.L. Mader, D.E. Spiers, J.A. Nienaber, J.L. Morrow-Tesch, A.M. Parkhurst)
- 42-023 ha**
Modifying pig performance through facility and diet management (M.C. Brumm)
- 42-024 ha**
Utilizing animal manures and fertilizers in cropping systems for northeast Nebraska (C.A. Shapiro)
- 42-025 ha**
Integrated weed management (IWM) for eastern Nebraska (S.Z. Knezevic)

Panhandle Research and Extension Center

- 44-004 st**
Fertilizer and manure application for production of continuous corn (D.D. Baltensperger)
- 44-016 ha**
Weed control systems for western Nebraska irrigated crops and rangeland (R.G. Wilson)
- 44-035 ha**
Feed resources and beef production systems in western Nebraska to optimize total efficiency (I.G. Rush, B.A. Weichenthal)
- 44-042 ha**
Agricultural enhancement of potato production and utilization (A.D. Pavlista)
- *44-050 ha**
Improvement of proso millet and other crops for western Nebraska (D.D. Baltensperger)
- 44-051 ha**
Agrichemical control in irrigation runoff water from surface irrigated fields (C.D. Yonts, R.G. Wilson)
- 44-052 ha**
The economics of alternative beef cattle marketing and feeding strategies (D.M. Feuz)
- 44-053 ha**
Machinery systems management for sugarbeets, dry edible beans, and chicory (J.A. Smith, R.G. Wilson)

- 44-054 rr**
Plant germplasm and information management and utilization (D.D. Baltensperger)
- 44-055 ha**
Intensification of winter wheat based dryland cropping systems for western Nebraska (D.J. Lyon)
- *44-056 st**
Taking advantage of winter wheat protein premium through late-season nitrogen fertilization (J.M. Blumenthal, D.M. Feuz, E.D. Kerr)
- 44-057 ha**
Studies of drought and defoliation effects on range grasses needed to optimize future grazing research (P.E. Reece, W.H. Schacht, J.D. Volesky, L.E. Moser)
- 44-058 ha**
Integrated management systems for arthropod pests of wheat and other crops in western Nebraska (G.L. Hein)

Roman L. Hruska U.S. Meat Animal Research Center

- 46-001 st**
Development and operation of the U.S. Meat Animal Research Center (D. Laster)

South Central Research and Extension Center

- 48-016 ha**
Soybean production practices and alternative crops within resource-efficient cropping systems for south central Nebraska (R.W. Elmore)
- 48-019 ha**
Managing weeds and herbicides for profitable crop production and reduced environmental risks (F.W. Roeth)
- 48-022 ha**
Crop insect pest management in Nebraska: biological control and sampling (R.J. Wright)
- 48-023 ha**
Formulation of nitrogen fertilization recommendations to maximize economic and environmental goals (R.A. Selley)

- 48-024 cg**
Epidemiology and life history of *Claviceps africana* in the Great Plains (J.P. Stack)
- 48-025 ha**
Subsurface drip irrigation: Integrated water and nitrogen BMPs for corn and assessing irrigation uniformity in situ (B.L. Benham)
- 48-026 ha**
Site-specific nutrient management strategies for irrigated and non-irrigated maize (R.B. Ferguson)

West Central Research and Extension Center

- *43-042 ha**
Sorghum and corn breeding and corn, sorghum, and wheat variety evaluation under central Nebraska environment conditions (P.T. Nordquist)
- *43-047 ha**
Selection and development of native herbaceous landscape plants (D.T. Lindgren)
- 43-057 ha**
Improving the profitability and sustainability of Sandhills beef cattle operations (R.T. Clark)
- 43-058 ha**
Biology, ecology, economics and control of major insects affecting cattle in Nebraska (J.B. Campbell)
- 43-059 ha**
Production systems and nutrition for Sandhills and Northern Great Plains range (D.C. Adams)
- 43-060 rr**
Management of arthropod pests of livestock and poultry (J.B. Campbell, C.D. Thomas)
- 43-061 ha**
Management practices to improve reproduction of beef heifers (G.H. Deutscher)
- 43-062 ha**
Genotype by environment interactions for sow productivity and early piglet growth (T.E. Long)
- 43-063 ha**
Grazing management strategies and systems for Sandhills meadows (J.D. Volesky)

***43-064 st**
Cow-calf-yearling beef production systems (D.C. Adams, T.C. Milton, T.J. Klopfenstein, R.T. Clark, J.D. Volesky)

43-065 ha
Integrated weed management in reduced tillage systems in low rainfall environments (G.A. Wicks)

43-066 ha
Selection, development and propagation of native herbaceous landscape plants (D.T. Lindgren)

43-067 ha
Economic and nitrate leaching implications of water conservation in Nebraska irrigated agriculture (N.A. Norton, R.T. Clark)

43-068 ha
Improving fertilizer management and recommendations for precision agriculture (G.W. Hergert)

Interdisciplinary Activities

Administration

01-001
General administration of federal fund research (D.W. Nelson)

01-004
Regional research coordination, North Central Region (D.W. Nelson)

Agricultural Research and Development Center

45-001 st
Field laboratory development (D. Duncan)

Center for Grassland Studies

33-001 st
Center for grassland studies (M.A. Massengale)

Center for Sustainable Agriculture Systems

31-002 st
Center for sustainable agricultural systems (C.A. Francis)

***31-003 cg**
Biological and economic consequences of flexible crop rotations (C.A. Francis)

31-004 sg
Integrated crop/livestock research for sustainable systems (C.A. Francis, T.J. Klopfenstein, J.R. Brandle)

31-005 sg
Integrated crop/livestock/agroforestry research for sustainable systems in Nebraska (T.J. Klopfenstein, J.R. Brandle, C.A. Francis)

Food Processing Center

19-003 st
Development and evaluation of food products, processes and markets (S.L. Taylor)

19-004 sg
Midwest food manufacturing alliance (S.L. Taylor)

19-008 sg
Development and quality/safety enhancement of specialty food products (S.L. Taylor)

Industrial Agricultural Products Center

29-007 sg
Industrial agricultural products center (M.A. Hanna)

29-008 st
Biodegradable plastics from corn starch and soybean oil (M.A. Hanna, V. Miladinov)

While serving the needs of Nebraska's agricultural producers, agribusinesses, industries, communities and citizens, the ARD places a high priority on being accountable for its resources and documenting impacts of its programs. As in all research institutions, ARD scientists are charged to actively disseminate results of research in scientific journals and technical publications. The division sets optimistic, but reachable, annual goals for scientific publication, theses and dissertations, and other measures of research output. In each of the last three years the goals have been exceeded.

Publications in refereed (peer reviewed) scientific journals represent professional

acknowledgment of the value of a research finding to the discipline. ARD scientists have published in a number of different scientific journals during 1999. Faculty also have written books, edited books or contributed chapters for books.

Another major contribution of the ARD research faculty is the education of graduate students pursuing a Master of Science (M.S.) or Doctor of Philosophy (Ph.D.) degree. One responsibility of a graduate degree is the completion of a thesis (M.S.) or a dissertation (Ph.D.)

Publications in refereed journals, books, book chapters, refereed proceedings, theses and dissertations are listed for calendar year 1999.

Journals in which faculty have published in 1999

Agricultural Economics

American Journal of Agricultural Economics
Empirical Economics
Great Plains Natural Resources Journal
Journal of Agricultural and Environmental Ethics
Journal of Cooperatives
Journal of Socioeconomics
The Journal of Rural Health
The Midbank Quarterly

Agricultural Leadership, Education and Communication

Online Journal of Distance Learning Administration
Psychological Reports

Agronomy

Agronomy Journal
American Journal of Alternative Agriculture
Anticancer Research
Applied Engineering in Agriculture
Bioremediation Journal
Biotechniques
Cereal Chemistry
Communications in Soil Science Plant Analysis
Crop Science
Environmental Pollution
Geoderma
HortScience
Journal of Alternative Agriculture
Journal of Cereal Science
Journal of Environmental Quality
Journal of Food and Agricultural Immunology
Journal of Natural Resources and Life Sciences Education
Journal of Plant Nutrition
Journal of Production Agriculture
Journal of Range Management
Journal of Soil and Water Conservation
Maydica
Plant Breeding
Plant Cell, Tissue and Organ Culture
Precision Agriculture Journal
Proceedings National Academy of Science
Rangelands

Soil Science Society of America Journal
Theoretical and Applied Genetics
Transactions of the American Society of Agricultural Engineers
Weed Research
Weed Science

Animal Science

Animal Reproduction Science
Asian-Australia Journal
Behavior Genetics
Biology of Reproduction
Bioresource Technology
Electrophoresis
Genetics
Genetics and Molecular Biology
Journal of Animal Science
Journal of Bacteriology
Journal of Dairy Science
Journal of Food Science
Journal of Muscle Foods
Journal of Range Management
Mammalian Genome
Molecular and Cellular Endocrinology
Obesity Research
Poultry Science
Revista Veterinaria Mexico
Theriogenology
Tissue and Cell

Biochemistry

Archives of Biochemistry and Biophysics
Biochemistry
Biochemical and Biophysical Research Communications
Biotechniques
Journal of Agricultural, Biological and Environmental Statistics
Journal of American Chemical Society
Journal of Bacteriology
Journal of Biological Chemistry
Journal of Food and Agricultural Immunology
Molecular and General Genetics
Molecular Cell Biology Research Communications
Photosynthesis Research
Proceedings of the National Academy of Science
Research Communication

Biological Systems Engineering

Agricultural Water Management
Applied Engineering in Agriculture
Bioresource Technology
Carcinogenesis
Cereal Chemistry
Computers and Electronics in Agriculture
Crop Science
Food Science Biotechnology
Industrial Crops and Products
International Journal of Pharmaceutics
Journal of Agriculture and Food Chemistry
Journal of Animal Science
Journal of Food Protection
Journal of Agricultural Engineering Research
Journal of Animal Science
Journal of Food Science
Journal of Environmental Quality
Journal of Production Agriculture
Lebensmittel-Wissenschaft und Technologie
Plant Cell, Tissue and Organ Culture
Transactions of the American Society of Agricultural Engineers
Sciences des Aliments

Biometry

Applied Statistics in Agriculture
Crop Science
Environmental Entomology
Journal of Agricultural, Biological and Environmental Statistics
Journal of Animal Science
Journal of Economic Entomology
Journal of Food Quality
Journal of Production Agriculture
Journal of Statistical Computation and Simulation
Online Journal of Distance Learning Administration

Entomology

American Entomologists
Annals of the Entomological Society of America
Archives of Insect Biochemistry and Physiology
Biological Control
Chemosphere
Comparative Biochemical Physiology Part A
Entomologia Experimentalis et Applicata
Entomology Experimental Applications
Environmental Entomology
Environmental Toxicology and Chemistry
Insect Biochemical Molecular Biology
Insect Molecular Biology

Journal of Economic Entomology
Journal of Insect Conservation
Journal of Insect Physiology
Journal of Lepidopterists' Society
Pesticide Biochemistry Physiology

Food Science and Technology

American Journal of Potato Research
Applied and Environmental Microbiology
Bioresource Technology
Cereal Chemistry
Electrophoresis
Enzyme Microbiology Technology
Food Additives and Contaminants
Food and Agriculture Immunology
Food Science and Biotechnology
Industrial Crops and Products
Journal of Agricultural and Food Chemistry
Journal of Food Protection
Journal of Food Quality
Journal of Food Science
Journal of Food Science and Biotechnology
Journal of Membrane Science
Proceedings National Academy of Science
Sciences des Aliments

Horticulture

Agronomy Journal
American Journal of Potato Research
Crop Science
Environmental Entomology
Environmental Pollution
Euphytica
HortScience
Journal of Economical Entomology
Journal of Environmental Horticulture
Journal of Food Quality
Journal of HortScience
Journal of the American Society for Horticultural Science
Plant Disease

Plant Pathology

Archives of Microbiology
Euphytica
Fungal Genetics and Biology
Journal of Biological Chemistry
Journal of Economic Entomology
Journal of the American Society for Horticultural Science
Molecular and General Genetics
Molecular Plant-Microbe Interactions
Phytopathology
Plant Cell Reports
Plant Disease
Virology

School of Natural Resource Sciences

Agricultural and Forest Meteorology
Annals of Entomological Society of America
Bioremediation Journal
Boundary-Layer Meteorology
Bulletin of American Meteorological Society
Environmental Science and Technology
Environmental Toxicology and Chemistry
Great Plains Research
Journal of Chromatography
Journal of Climate
Journal of Economic Entomology
Journal of Environmental Quality
Journal of Environmental Toxicology and Chemistry
Journal of HortScience
Journal of Lake and Reservoir Management
Journal of Production Agriculture
Remote Sensing of Environment
Technology
Wetlands

Veterinary and Biomedical Sciences

Chemical Toxicology
Compendium's Food Animal Medicine and Management
FEMS Microbiology Letters
Food and Chemical Toxicology
Infection and Immunity
Journal of Animal Science
Journal of Biological Chemistry
Journal of Clinical Microbiology
Journal of Medical Primatology
Journal of Virology
Molecular and General Genetics

Human Resources and Family Sciences Departments

Family and Consumer Sciences

Housing and Society
Journal of Family and Consumer Sciences
Psychotherapy: Theory/Research/Practice/Training

Nutritional Science and Dietetics

International Journal of Sports Nutrition
Journal of Family and Consumer Sciences
Journal of Food Science
Journal of the American Dietetic Association
Metabolism
Nutrition Research
Sciences des Aliments

Textile, Clothing and Design

Business Review
Journal of Family and Consumer Sciences
Journal of Family and Consumer Sciences Research Journal
Textile Chemist and Colorist

Off-Campus Research Centers

Northeast Research and Extension Center

Communications in Soil Science and Plant Analyses
Environmental Entomology
Journal of Animal Science
Journal of Production Agriculture
The Professional Animal Scientists

Panhandle Research and Extension Center

American Journal of Potato Research
Applied Engineering in Agriculture
Crop Science
Great Plains Research
Journal of Agricultural and Resource Economics
Journal of Agricultural Engineering Research
Journal of Animal Science
Journal of Production Agriculture
Journal of Range Management
Journal of Sugar Beet Research
Phytopathology
Transactions of the American Society of Agricultural Engineers
Weed Science
Weed Technology

South Central Research and Extension Center

Geoderma
Journal of Environmental Quality
Journal of Production Agriculture
Pesticide Biochemistry Physiology
Weed Science

West Central Research and Extension Center

Geoderma
HortScience
Journal of Animal Science
Journal of Range Management
Large Animal Practice
Transactions of the American Society of Agricultural Engineers
Weed Science

Research Publications (1999)

Agricultural/Natural Resources Units

Agricultural Economics

Journal Articles

- Aiken, J.D. 1999. Balancing endangered species protection and irrigation water rights: The Platte River Cooperative Agreement. *Great Plains Natural Resources Journal* 3:119-158. (J. Series No. 12595)
- Azzam, A.M. 1999. Asymmetry and stickiness in farm-retail price transmission. *American Journal of Agricultural Economics* 81:525-533. (J. Series No. 12513)
- Azzam, A.M. and E. Pagoulatos. 1999. Measurement of technological and market structure - alternative methodological perspectives. *American Journal of Agricultural Economics* 81:644-646. (J. Series No. 12518)
- Cordes, S., E. Vander Sluis, C. Lamphear, and J. Hoffman. 1999. Rural hospitals and the local economy: A needed extension and refinement of existing empirical research. *The Journal of Rural Health* 15:189-201. (J. Series No. 12489)
- Lynne, G.D. 1999. Divided self models of the socioeconomic person: The metaeconomics approach. *Journal of Socioeconomics* 28:267-288. (J. Series No. 12403)
- Mueller, K.J., A. Coburn, S. Cordes, R. Crittenden, J.P. Hart, T. McBride, and W. Myers. 1999. The changing landscape of health care financing and delivery: How are rural communities and providers responding? *The Milbank Quarterly* 77:485-510. (J. Series No. 12778)

- Peterson, E.W.F. 1999. The ethics of burden-sharing in the global greenhouse. *Journal of Agricultural and Environmental Ethics* 11:167-196. (J. Series No. 12346)
- Royer, J.S. 1999. Cooperative organizational strategies: A neo-institutional digest. *Journal of Cooperatives* 14:44-67. (J. Series No. 12565)
- Ziari, H. and A.M. Azzam. 1999. Parametrizing nonparametric translog models: A goal programming/constrained regression of U.S. manufacturing. *Empirical Economics* 24:331-340. (J. Series No. 11654)

Book Chapters

- Azzam, A.M. and E. Pagoulatos. 1999. Vertical relationships: Economic theory and empirical evidence, p. 7-20. *In: G. Galizzi and L. Venturini (eds.), Vertical Relationships and Coordination in the Food System*. Physica:Verlag Publishing, Heidelberg, Germany.
- Casey, F. and G.D. Lynne. 1999. Adoption of water conserving technologies in agriculture: The role of expected profits and the public interest, p. 229-247. *In: F. Casey, A. Schmitz, S. Swinton and D. Zilberman (eds.), Flexible Incentives for the Adoption of Environmental Technologies in Agriculture*. Kluwer Academic Publishers, Norwell, Massachusetts.

Research Bulletins

- Norton, N.A., M. Baker, R.T. Clark, and S. Elmore. 1999. Operator attitudes toward recreational use and development of wildlife habitat on Nebraska CRP land. *Research Bulletin* 335. University of Nebraska Agricultural Research Division.

Refereed Proceedings

- Hoegemeyer, C., G.A. Helmers, and R.T. Clark. 1999. Economic optimization and a decision analysis for summer calving, p. 11-14. *In: University of Nebraska Gudmundsen Sandhills Laboratory Field Day Report, WCC-99-1026*.

- Ortmann, J., G. Pfeiffer, and J. Stubbendieck. 1999. Economic comparison of eastern redcedar control in the Nebraska Loess Hills, p. 83-90. *In: E.T. Bartlett and L.W. Van Tassel (eds.), Grazingland Economics and Policy*. Proceedings of the Western Coordinating Committee on Range Economics, WCC-55. Society for Range Management, Denver, CO.

- Sahs, W.W., G.A. Helmers, G. Lesoing, and C.A. Francis. 1999. Economic and biological impacts of long-term rotations in Nebraska, U.S.A., p. 116-124. *In: Proceedings of the 12th International Federation of Organic Agricultural Movements, Mar Del Plata, Providence of Buenos Aires, Argentina*.
- Wade, M.A. and D.M. Conley. 1999. Consumer responses to food safety information from print media. *In: Proceedings from the International Food and Agribusiness Management Association, Session B3*. http://agecon.tamu.edu/ama/1999_forum_papers.htm.

M.S. Theses

- Wilson, R.K. 1999. Using the futures market to develop a post-harvest soybean marketing plan basis estimation and other considerations. (G.H. Pfeiffer, Advisor)
- Zhongzhan, C. 1999. The farm-retail price spread and power structure in the food marketing channel. (A.M. Azzam, Advisor)

Ph.D. Dissertations

- Dias, W. 1999. Intra-year strategic planning of crop production under embedded risks. (G.A. Helmers, Advisor)
- Intarapapong, W. 1999. Environmentally adjusted measures of gains from trade liberalization: The case of U.S. corn production. (E.W.F. Peterson, Advisor)
- Takpara, K. 1999. Togolese cereal demand: An application of linear expenditures, Rotterdam and almost ideal demand systems. (A.M. Azzam, Advisor)

Agricultural Leadership, Education and Communication

Journal Articles

- Barbuto, J.E., and R.W. Scholl. 1999. Leader's motivation and leader's perception of follower's motivation as predictors of leader's influence tactics. *Psychological Reports* 84:1087-1098. (J. Series No.12509).
- Rockwell, S.K., J. Schauer, S. Fritz, and D. Marx. 1999. Incentives and obstacles influencing higher education faculty and administration to teach via distance. *Online Journal of Distance Learning Administration*. <http://www.westga.edu/~distance/jmain11.html>

Agronomy

Journal Articles

- Anderson, B. 1999. Grasslands and forages of Nebraska. *Rangelands* 21:5-8. (J. Series No. 12465)
- Beran, D.D., R.E. Gaussoin, and R.A. Masters. 1999. Native wildflower establishment with imidazolinone herbicides. *HortScience* 34:283-286. (J. Series No. 12180)
- Beran, D.D., R.A. Masters, and R.E. Gaussoin. 1999. Grassland legume establishment with imazethapyr and imazapic. *Agronomy Journal* 91:592-596. (J. Series No. 12297)
- Bhatti, M.H., L.A. Nelson, D.D. Baltensperger, D.J. Lyon, S.D. Kachman, and G.E. Frickel. 1999. Influence of planting dates and populations on seed yield and plant characters of sunflower in the High Plains. *Journal of Production Agriculture* 12:38-42. (J. Series No. 12128)

- Cahoon, J.E., D.E. Eisenhauer, R.W. Elmore, F.W. Roeth, B. Douppnik, Jr., R.A. Selley, K. Frank, R.B. Ferguson, M. Lorenz, and L.J. Young. 1999. Corn yield response to tillage with furrow irrigation. *Journal of Production Agriculture* 12:269-275. (J. Series No. 12134)
- Cassman, Kenneth G. 1999. Ecological intensification of cereal production systems: yield potential, soil quality, and precision agriculture. *Proceedings National Academy of Science* 96:5952-5959. (J. Series No. 12686)
- Cullan, A.P., P.E. Reece, and W.H. Schacht. 1999. Early-summer grazing effects on defoliation and tiller demography of prairie sandreed. *Journal of Range Management* 52:447-453. (J. Series No. 12225)
- Dieleman, J.A. and D.A. Mortensen. 1999. Characterizing the spatial pattern of *Abutilon theophrasti* seedling patches. *Weed Research* 39:455-467. (J. Series No. 12552)
- Dieleman, J.A., D.A. Mortensen, A.R. Martin, and D.Y. Wyse-Pester. 1999. Influence of velvetleaf (*Abutilon theophrasti*) and common sunflower (*Helianthus annuus*) density variation on weed management outcomes. *Weed Science* 47:81-89. (J. Series No. 12209)
- Duvick, D.N. and K.G. Cassman. 1999. Post-green-revolution trends in yield potential of temperate maize in the North Central United States. *Crop Science* 39:1622-1630. (J. Series No. 12687)
- Eghball, B. 1999. Liming effects of beef cattle feedlot manure or compost. *Communications in Soil Science Plant Analysis* 30:2563-2570. (J. Series No. 12510)
- Eghball, B. and J.E. Gilley. 1999. Phosphorus and nitrogen in runoff following beef cattle manure or compost application. *Journal of Environmental Quality* 28:1201-1210. (J. Series No. 12487)
- Eghball, B., G.W. Hergert, G.W. Lesoing, and R.B. Ferguson. 1999. Fractal analysis of spatial and temporal variability. *Geoderma* 38:349-362. (J. Series No. 12112)
- Eghball, B. and J.F. Power. 1999a. Phosphorus and nitrogen-based manure and compost application: Corn production and soil phosphorus. *Soil Science Society of America Journal* 63:895-901. (J. Series No. 12133)
- Eghball, B. and J.F. Power. 1999b. Composted and non-composted manure application to conventional and no-tillage systems: Corn yield and nitrogen uptake. *Agronomy Journal* 91:819-825. (J. Series No. 12222)
- Espitia-Rangel, E., P.S. Baenziger, R.A. Graybosch, D.R. Shelton, B. Moreno-Sevilla, and C.J. Peterson. 1999a. Agronomic performance and stability of 1A vs. 1AL IRS genotypes derived from winter wheat 'Nekota'. *Crop Science* 39:643-648. (J. Series No. 12121)
- Espitia-Rangel, E., P.S. Baenziger, D.R. Shelton, R.A. Graybosch, B. Moreno-Sevilla, and C.J. Peterson. 1999b. End-use quality performance and stability of 1A vs. 1AL IRS genotypes derived from winter wheat 'Nekota'. *Crop Science* 39:649-654. (J. Series No. 12124)
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- Gilley, J.E., B. Eghball, J.M. Blumenthal, and D.D. Baltensperger. 1999. Interrill erosion as affected by the application of beef cattle manure. *Transactions of the American Society of Agricultural Engineers* 42:975-980. (J. Series No. 12447)
- Graef, G.L. and J.E. Specht. 1999a. Registration of the SG1P soybean population with high seed protein and ms2 nuclear male sterility. *Crop Science* 39:1261. (J. Series No. 12417)
- Graef, G.L. and J.E. Specht. 1999b. Registration of the SG1LS soybean population with large seed size and ms2 nuclear male sterility. *Crop Science* 39:1261-1262. (J. Series No. 12406)
- Graybosch, R.A., C.J. Peterson, G.A. Harelend, D.R. Shelton, M.C. Olewnik, H. He, and M.M. Stearns. 1999. Relationships between small-scale wheat quality assays and commercial test bakes. *Cereal Chemistry* 76:428-433. (J. Series No. 12270)
- Graybosch, R.A., J.-H. Lee, C.J. Peterson, D.R. Porter, and O.K. Chung. 1999. Genetic, agronomic and quality comparisons of two 1AL IRS wheat-rye chromosomal translocations. *Plant Breeding* 118:125-130. (J. Series No. 11237)
- Graybosch, R.A., C.J. Peterson, and O.K. Chung. 1999. Quality effects of rye (*Secale cereale* L.) Chromosome arm 1RL transferred to wheat (*Triticum aestivum* L.). *Journal of Cereal Science* 29:211-216. (J. Series No. 12123)
- Graybosch, R.A., K.S. Schemmerhorn, and J. Skerritt. 1999. An enzyme-linked immunosorbent assay for the identification of wheats carrying null alleles at genetic loci encoding the granule-bound starch synthase. *Journal of Cereal Science* 30:159-163. (J. Series No. 12598)
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- Kreslavski, V.D., G.K. Vasilyeva, S.D. Comfort, R.A. Drijber, and P.J. Shea. 1999. Accelerated transformation and binding of 2,4,6-trinitrotoluene in rhizosphere soil. *Bioremediation Journal* 3:59-67. (J. Series No. 12333)
- Krishnan, G., G.L. Horst, S. Darnell, and W.L. Powers. 1999. Growth and development of smooth bromegrass and tall fescue in TNT-contaminated soil. *Environmental Pollution* 101:1-8. (J. Series No. 12190)
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- Lesoing, G.W. and C.A. Francis. 1999a. Strip intercropping of corn/soybean in irrigated and rainfed environments. *Journal of Production Agriculture* 12:127-128, 187-192. (J. Series No. 12155)
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- Lesoing, G.W. and C.A. Francis. 1999c. Strip intercropping effects on yields and yield components of corn, grain sorghum, and soybean. *Agronomy Journal* 91:807-813. (J. Series No. 12271)
- Liebig, M.A. and J.W. Doran. 1999a. Evaluation of point-scale assessments of soil quality. *Journal of Soil and Water Conservation* 54:510-518. (J. Series No. 12087)
- Liebig, M.A. and J.W. Doran. 1999b. Evaluation of farmers' perceptions of soil quality indicators. *American Journal of Alternative Agriculture* 14:194-206. (J. Series No. 12065)
- Liebig, M.A. and J.W. Doran. 1999c. Impact of organic production practices on soil quality indicators. *Journal of Environmental Quality* 28:1601-1609. (J. Series No. 12517)
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- Pedersen, J.F. and J.J. Toy. 1999b.
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Guernsey, G.K. 1999. Evaluation of model ground beef and ground beef-soy loaf formulations. (F.L. Hamouz, Advisor)

Harris, N.G. 1999. Evaluation of job satisfaction and job performance of school food service workers in Lincoln public schools. (F.L. Hamouz, Advisor)

Hayes, C.A. 1999. Effect of folate supplementation on plasma homocysteine in young women. (J.A. Albrecht, Advisor)

Kollman, K.A. 1999. The effects of dietary lipids on intestinal adaptation following massive bowel resection. (K.L. Stanek, Advisor)

Lutt, K.A.H. 1999. Comparison of folate determination in selected vegetables by HPLC and microbiological methods. (J.A. Albrecht, Advisor)

Lamb, M.S. 1999. Determining attitudes of Nebraska youth (ages 12-14) towards vegetables using focus group methods. (J.A. Albrecht, Advisor)

Skrabal, J.C. 1999. Body image assessment and dieting behaviors among males and females with cystic fibrosis. (K.L. Stanek, Advisor)

Ph.D. Dissertation

Wu, Y. 1999. Development and application of multicomponent edible films. (M.I. Schnepf, Advisor)

Textiles, Clothing and Design

Journal Articles

Beyer, A. and P.C. Crews. 1999. Influence on UVR transmission of undyed fabrics. *Textile Chemist and Colorist* 31:17-26. (J. Series No. 12041)

Danes, S., R. Zuiker, R.C. Kean, and J. Arbutnot. 1999.

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Miller, N.J., R.C. Kean, and M.A. Littrell. 1999a.

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Exploring consumer and retailer exchange in rural communities: Part II. *Family and Consumer Sciences* 28:99-121. (J. Series No. 12539)

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Ph.D. Dissertation

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Off-Campus Research Centers

Northeast Research and Extension Center

Journal Articles

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Gaughan, J.B., T.L. Mader, S.M. Holt, M.J. Josey, and K.J. Rowan. 1999.

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Mader, T.L., J.M. Dahlquist, G.L. Hahn, and J.B. Gaughan. 1999.

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Hubbard, K.G., D.E. Stookesbury, G.L. Hahn, and T.L. Mader. 1999.

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Shapiro, C.A. 1999.

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M.S. Thesis

Mueller, J.L. 1999. The effect of swine effluent application on corn and alfalfa yields, soil nutrients, and water quality. (C.A. Shapiro and B.E. Anderson, Advisors)

Ph.D. Dissertation

Hunt, Thomas Elliott. 1999. Dispersal and behavior of adult European corn borer in and around corn. (Advisors: J.F. Witkowski and L.G. Higley)

Panhandle Research and Extension Center

Journal Articles

Bhatti, M.H., L.A. Nelson, D.D. Baltensperger, D.J. Lyon, S.D. Kachman, and G.E. Frickel. 1999.

Influence of planting dates and populations on seed yield and plant characteristics of sunflower in the High Plains. *Journal of Production Agriculture* 12:38-42. (J. Series No. 12128)

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Feuz, D.M. 1999.

Market signals in value based pricing premiums and discounts. *Journal of Agricultural and Resource Economics*. 24:327-341. (J. Series No. 12511)

Gilley, J.E., B. Eghball, J.M. Blumenthal, and D.D. Baltensperger. 1999.

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- Guenther, J.F., M.V. Wiese, A.D. Pavlista, J.B. Siczka, and J. Wyman. 1999. Assessment of pesticide use in the U.S. potato industry. *American Journal of Potato Research* 76:25-29. (J. Series No. 12191)
- Jasieniuk, M., B.D. Maxwell, R.L. Anderson, J.O. Evans, D.J. Lyon, S.D. Miller, D.W. Morishita, A.G. Ogg Jr., S. Seefeldt, P.W. Stahlman, F.E. Northam, P. Westra, Z. Kebede, and G.A. Wicks. 1999. Site-to-site and year-to-year variation in *Triticum aestivum-Aegilops cylindrica* interference relationships. *Weed Science* 47:529-537. (J. Series No. 12654)
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- Lyon, D.J. and D.R. Shelton. 1999. Fallow management and nitrogen fertilizer influence winter wheat kernel hardness. *Crop Science* 39:448-452. (J. Series No. 12246)
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- Miller-Goodman, M.S., L.E. Moser, S.S. Waller, J.E. Brummer, and P.E. Reece. 1999. Canopy analysis as a technique to characterize defoliation intensity on Sandhills range. *Journal of Range Management* 52:357-362. (J. Series No. 11925)
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- Rife, C.L., D.L. Auld, H.D. Sunderman, W.F. Heer, D.D. Baltensperger, D.L. Johnson, D. Bordovsky, and H.C. Minor. 1999. Registration of KS1701 rapeseed germplasm. *Crop Science* 39:1260. (J. Series No. 12540)
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- Smith, J.A., C.D. Yonts, and K.L. Palm. 1999. Field loss from sugarbeet harvest operations. *Applied Engineering in Agriculture* 15:627-631. (J. Series No. 12546)
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- Tilton, S.L., P.S. Miller, A.J. Lewis, D.E. Reese, and P.M. Ermer. 1999b. Addition of fat to the diets of lactating sows: II. Effects on hormone-sensitive lipase activity, energy mobilization in response to epinephrine, and plasma insulin and glucose concentrations. *Journal of Animal Science* 77:2501-2509. (J. Series No. 12329)
- Volesky, J.D., W.H. Schacht, and P.E. Reece. 1999. Leaf area, index visual obstruction, and standing crop relationships on Sandhills rangeland. *Journal of Range Management* 52:494-499. (J. Series No. 12296)
- Wilson, R.G. 1999. Response of nine sugarbeet *Beta vulgaris* cultivars to postemergence herbicide applications. *Weed Technology* 13:25-29. (J. Series No. 12352)
- Wilson, R.C. and S.D. Kachman. 1999. Effect of perennial grasses on Canada thistle *Cirsium arvense* control. *Weed Technology* 13:83-87. (J. Series No. 12248)
- Yonts, C.D., J.A. Smith, and R.G. Wilson. 1999. Effect of seed coating, planter type, and depth of planting on sugarbeet emergence. *Journal of Sugar Beet Research* 36:1-10. (J. Series No. 12381)
- Yonts, C.D., R.G. Wilson, and J.A. Smith. 1999. Influence of planting date on stand, yield and quality of sugarbeet. *Journal of Sugar Beet Research* 36:1-14. (J. Series No. 12218)

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- Wilson, R.G., J.A. Smith, C.D. Yonts, and C.A. Hibberd. 1998. Chicory production in Nebraska (USA) for inulin processing, p. 13-24. *In: A. Fuchs and A. Van Laere (eds.), Proc. Seventh Seminar on Inulin*, January 22-23, 1998, Leuven, Belgium, European Fructan Association, Stuttgart, Germany.

Book

- Scherer, T.F., W.L. Kranz, D. Pfost, H. Werner, J.A. Wright, and C.D. Yonts. 1999. *Sprinkler Irrigation Systems - MWPS -30*, 1st ed. Midwest Plan Service, Ames, IA.

Book Chapters

- Guillen-Portal, F.R., D.D. Baltensperger, L.A. Nelson, N. D'Croze-Mason. 1999. Variability in 'Plainsman' Grain Amaranth, p.184-189. *In: J. Janick (ed), Perspectives on New Crops and New Uses*. University of Nebraska Agricultural Research Division, Lincoln, NE.
- Guillen-Portal, F.R., D.D. Baltensperger, and L.A. Nelson. 1999. Plant population influence on yield and agronomic traits in 'Plainsman' Grain Amaranth, p.190-191. *In: J. Janick (ed.), Perspectives on New Crops and New Uses*. University of Nebraska Agricultural Research Division, Lincoln, NE.

- Hein, G.L. 1999. Wheat Curl Mite, p.113-114. *In: K.L. Steffey, M.E. Rice, J. All, D.A. Andow, M.E. Gray, and J.W. Van Duyn (eds.), ESA Handbook of Corn Insects*. Entomological Society of America, Lanham, MD.

Ph.D. Dissertation

- Amador-Ramirez, M.D. 1999. Weed emergence and in-row weed control in dry bean. (R.G. Wilson and A. Martin, Advisors)

South Central Research and Extension Center

Journal Articles

- Cahoon, J.E., D.E. Eisenhauer, R.W. Elmore, F.W. Roeth, B. Doupnik Jr., R.A. Selley, K. Frank, R.B. Ferguson, M. Lorenz, and L.J. Young. 1999. Corn yield response to tillage with furrow irrigation. *Journal of Production Agriculture* 12:269-275. (J. Series No. 12134)
- Eghball, B., G.W. Hergert, G.W. Lesoing, and R.B. Ferguson. 1999. Fractal analysis of spatial and temporal variability. *Geoderma* 88:349-362. (J. Series No. 12112)
- Elmore, R.W. and Fred W. Roeth. 1999. Corn kernel weight and grain yield stability during post-maturity drydown. *Journal of Production Agriculture* 12:300-305. (J. Series No. 12274)
- Elmore, R.W. and R.B. Ferguson. 1999. Mid-season stalk breakage in corn: Hybrid and environmental factors. *Journal of Production Agriculture* 12:293-299. (J. Series No. 12188)
- Lee, C.D., A.R. Martin, F.W. Roeth, B.E. Johnson, and D.J. Lee. 1999. Comparison of ALS inhibitor resistance and allelic interactions in shattercane accessions. *Weed Science* 47:275-281. (J. Series No. 12408)
- Scharf, M.E., L.J. Meinke, R.J. Wright, L.D. Chandler, and B.D. Siegfried. 1999. Metabolism of carbaryl by insecticide-resistant and -susceptible western corn rootworm populations (Coleoptera: Chrysomelidae). *Pesticide Biochemistry Physiology* 63:85-96. (J. Series No. 12348)
- Schepers, J.S., M.R. Schlemmer, and R.B. Ferguson. 1999. Site-specific considerations for managing phosphorus. *Journal of Environmental Quality* 29:125-130. (J. Series No. 12637)

West Central Research and Extension Center

Journal Articles

Eghball, B., C.W. Hergert, C.W. Lesoing, and R.B. Ferguson. 1999. Fractal analysis of spatial and temporal variability. *Geoderma* 88:349-362. (J. Series No. 12112)

Jasieniuk, M., B.D. Maxwell, R.L. Anderson, J.O. Evans, Z. Kebede, D.J. Lyon, S.D. Miller, D.W. Morishita, F.E. Northam, A.G. Ogg, S. Seefeldt, P.W. Stahlman, P. Westra, and G.A. Wicks. 1999. Development of a bioeconomic model for the management of jointed goatgrass (*Aegilops cylindrica*) in winter wheat (*Triticum aestivum*). *Weed Science* 467:529-537. (J. Series No. 12654)

Klocke, N.L., D.G. Watts, J.P. Schneekloth, D.R. Davison, R.W. Todd, and A.M. Parkhurst. 1999. Nitrate leaching in irrigated corn and soybean in a semi-arid climate. *Transaction of the American Society of Agricultural Engineers* 42:1621-1630. (J. Series No. 12462)

Lardy, G.P., D.C. Adams, T.J. Klopfenstein, and R.T. Clark. 1999.

First limiting nutrient for summer calving cows grazing autumn-winter range. *Journal of Range Management* 52:317-326. (J. Series No. 11952)

Lindgren, D.T. and D.M. Schaaf. 1999. 'Prairie Palette' Penstemon. *HortScience* 34:368-369. (J. Series No. 12203)

Olson, P.A., D.R. Brink, D.T. Hickok, M.P. Carlson, N.R. Schneider, G.H. Deutscher, D.C. Adams, D.J. Colburn, and A.B. Johnson. 1999. Effects of supplementation of organic and inorganic combinations of copper, cobalt, manganese, and zinc above nutrient requirement levels on postpartum two-year-old cows. *Journal of Animal Science* 77:522-532. (J. Series No. 12162)

Sandberg, R.E., D.C. Adams, T.J. Klopfenstein, and R.J. Grant. 2000. N-Alkane as an internal marker for predicting digestibility of forages. *Journal of Range Management* 53:159-163. (J. Series No. 12440)

Snell, R.R., J.E. Keen, S. Bradley, and J.L. Johnson. 1999.

Fecal shedding of Salmonella in a beef herd following a clinical outbreak. *Large Animal Practice* 20:20-24. (J. Series No. 12332)

Volesky, J.D. and S.B. Connot. 1999. Vegetation response to late growing-season wildfire on Nebraska Sandhills rangeland. *Journal of Range Management* 53:421-426. (J. Series No. 12729)

Volesky, J.D., W.H. Schacht, and P.E. Reece. 1999. Leaf area index, visual obstruction, and standing crop relationships on Sandhills rangeland. *Journal of Range Management* 52:494-499. (J. Series No. 12296)

Research Bulletin

Norton, N.A., M. Baker, R.T. Clark, and S. Elmore. 1999. Operator attitudes toward recreational use and development of wildlife habitat on Nebraska CRP land. *Research Bulletin* 335. University of Nebraska Agricultural Research Division.

Refereed Proceeding

Hoegemeyer, C., G.A. Helmers, and R.T. Clark. 1999. Economic optimization and a decision analysis for summer calving, p. 11-14. *In: University of Nebraska Gudmundsen Sandhills Laboratory Field Day Report, WCC-99-1026.*

Ph.D. Dissertation

Horney, M. Spring grazing: A management alternative for Sandhills wet meadows. (D.C. Adams and W. Schacht, Advisors)

ARD receives funding from federal formula funds, industry grants, federal grants and state appropriations. During fiscal year 1999-2000, faculty with ARD appointments obtained grant and contract funds that totaled \$23,193,240. This amount represents 47.1 percent of all research grant and contract funds received by UNL. The extra-mural funds coming to ARD faculty to address problems of importance to Nebraska have a significant direct impact on the state's economy.

Report of Research Expenditures The University of Nebraska Agricultural Research Division July 1, 1999 through June 30, 2000

Federal Formula Funds:

Hatch Formula	\$2,311,502
Regional Research	\$ 654,540
McIntire-Stennis	\$ 136,805
Animal Health	\$ 137,805

Total Federal Formula Funds \$ 3,240,652

State Appropriated Funds \$25,976,723

Nebraska Research Initiative Funds \$ 2,242,853

Contracts and Grants:

USDA Cooperative Agreements \$1,167,609

USDA Special and Competitive Grants .. \$3,603,557

Federal Grants -
(NSF, NIH, USEPA, AID, DOE) \$5,029,841¹

Industry Grants \$8,222,493 |

Total Grants and Contract \$18,023,500

Product Sales \$ 6,881,758

Total Expenditures \$56,058,995

¹\$226,974 was included to show actual Agricultural Research Division expenditures reflecting transfers from International Programs.

Agricultural Research Division

Research Investments by Category and Funding Source FY 2000

<i>Expenditure Category</i>	<i>State Appropriated and Hatch Funds</i>	<i>Federal Grants</i>	<i>Industry Grants</i>	<i>Revolving Funds</i>	<i>All Funds</i>
	_____ % of total within source _____				
Salaries, Wages and Benefits					
Faculty/Administrative	41.5	5.0	4.6	1.9	14.0
Managerial/Prof	13.8	8.6	6.3	4.4	8.9
Office/Service	11.0	5.3	6.0	14.7	7.7
Hourly Wages	0.8	3.3	4.6	3.4	3.1
GRA Stipends	5.7	12.8	14.6	1.8	10.7
Benefits	13.0	5.9	5.9	5.2	7.6
Subtotal:	85.8	40.9	42.0	31.4	52.0
Operating					
Supplies and Expenses	11.4	54.0	49.5	55.5	41.9
Travel	0.8	3.5	4.1	3.1	3.0
Equipment	2.0	1.6	4.4	10.0	3.1
Subtotal:	14.2	59.1	58.0	68.6	48.0
Total:	100.0	100.0	100.0	100.0	100.0

Agricultural Research Division Selected Research Program Information

Category	FY 1998	FY 1999	FY2000
Project Information:			
Projects at beginning of year	387	368	399
Projects terminating	57	23	42
Projects revised	11	11	6
New projects	38	54	26
Projects at the end of the year	368	399	383
Faculty full-time equivalents (FTE)	130.8	129.9	130.4
Expenditures for budgeted research faculty:			
Federal formula and state approp., \$/FTE ¹	\$239,650	\$258,582	\$241,259
Grant and contracts, \$/FTE	\$116,030	\$135,262	\$138,217
Product sales, \$/FTE	\$ 58,127	\$ 51,357	\$ 52,774
Outputs from research programs²:			
Refereed journal articles	289	274	327
Research bulletins	1	2	1
Books and book chapters	49	68	45
M.S. and Ph.D. theses	136	148	115
Cultivars and germplasm released	7	13	17
Patents obtained	5	3	6

¹Includes cost of administration and expenditures from the Nebraska Research Initiative by ARD-affiliated faculty.

²A large number of abstracts, technical reports, and other non-refereed articles also are published by faculty each year.