Agricultural Research Division 114th Annual Report 2000
Agricultural Research Division

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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 300 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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To simplify technical terminology, trade names of products or equipment sometimes are used. No endorsement of products is intended nor is criticism implied of products not mentioned.

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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.
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
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 monitors 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.
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.
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 phosphoruses 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 content 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 benefits annually.

An IANR agricultural economist’s analysis showed that feeding byproducts wet instead of drying them provided considerable 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.](image-url)
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 socioeconomic 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.

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

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 can become latent 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 treatments 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.

Turfgrass Scientist Roch Gaussoin measures the hardness of this golf green as Research Technologist Milda Vaitkus records data.

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
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 recoup these acres as CRP contracts expired. The CRP to Crops project explored residue management, weed control, tillage 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.
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 Bultensperger 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 “$CO_2$ 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 Wolfd 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 Areaewide 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 Maiben 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. Shearnan, 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.

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.
ne 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 Shauk 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 Neil 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 Alamalakula 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 AgroSciences. 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 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.

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

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 Mülu 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.

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.

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)

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 “Nonsymbiotic Plant Hemoglobins” from the Agricultural Research Division. (G. Sarath, Advisor)

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

Veterinary and Biomedical Sciences

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)

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)
AR D 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.
<table>
<thead>
<tr>
<th>Crop:</th>
<th>Grain Sorghum [ <em>Sorghum bicolor</em> (L.) Moench]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germplasm</td>
<td>Restorer Line N312R</td>
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<tr>
<td>Release</td>
<td></td>
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<tr>
<td>Characteristics:</td>
<td>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.</td>
</tr>
<tr>
<td>Crop:</td>
<td>Grain Sorghum [ <em>Sorghum bicolor</em> (L.) Moench]</td>
</tr>
<tr>
<td>Germplasm</td>
<td>N316, N317, N318, N319, N320</td>
</tr>
<tr>
<td>Release</td>
<td></td>
</tr>
<tr>
<td>Scientists</td>
<td>J.F. Pedersen and J.J. Toy</td>
</tr>
<tr>
<td>Released By</td>
<td>United States Department of Agriculture Agriculural Research Service and the University of Nebraska Agricultural Research Division</td>
</tr>
<tr>
<td>Characteristics:</td>
<td>These genetic stocks are near iso-lines of <em>Bwheatland</em> (Btx399) and contain the nuclear male-sterility genes <em>ms1</em>, <em>ms2</em>, <em>ms3</em>, <em>ms7</em>, or <em>al</em>. 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.</td>
</tr>
<tr>
<td>Crop:</td>
<td>Grain Sorghum [ <em>Sorghum bicolor</em> (L.) Moench]</td>
</tr>
<tr>
<td>Germplasm</td>
<td>20 Near-Isogenic genetic stocks (N321-N340)</td>
</tr>
<tr>
<td>Release</td>
<td></td>
</tr>
<tr>
<td>Scientists</td>
<td>J.F. Pedersen and J.J. Toy</td>
</tr>
<tr>
<td>Released By</td>
<td>United States Department of Agriculture Agriculural Research Service and the University of Nebraska Agricultural Research Division</td>
</tr>
<tr>
<td>Characteristics:</td>
<td>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 <em>S8</em> segregates of a single <em>S3</em> family from the <em>Bc1</em> generation of the cross (<em>Btx398 ms3 x Btx630</em>) <em>ms3 x Btx630</em>. 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.</td>
</tr>
</tbody>
</table>
Crop: Grain Sorghum \([Sorghum\ bicolor\ (L.)\ Moench]\)
Germplasm Release: Population NP41B
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, 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: Soybean \( (Glycine\ max\ (L.)\ Merr.)\)
Variety Release: NE3297
Scientists: G.L. Graef
Characteristics: NE3297 is derived from the cross ‘Parker’ x ‘Asgrow A935’. 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 \([\text{Glycine max (L.) Merr.}]\)

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), NE3400 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 \([\text{Glycine max (L.) Merr.}]\)

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 bulacre higher yield, similar plant height, and brown pods at maturity. Seeds are dull yellow with a yellow hilum. The spike is medium lax and medium long. In 17 trials grown in Nebraska (1991-1993), P-721 yielded 50.9 bu/a. This yield was higher than Dundy (47.4 bu/a), Hitchcock (42.4 bu/a), and Perkins (49.4 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 \((\text{Hordeum vulgare L.})\)

Variety Release: P-721


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 flowers 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)
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**

<table>
<thead>
<tr>
<th>Patent Title:</th>
<th>Method for transforming soybean</th>
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<tbody>
<tr>
<td>Patent Number:</td>
<td>5,959,179</td>
</tr>
<tr>
<td>Description:</td>
<td>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.</td>
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**Animal Science**

<table>
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<tr>
<th>Patent Title:</th>
<th>A feeding program for the production of feed to produce omega-3 fatty acid enriched eggs and methods for producing such eggs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patent Number:</td>
<td>5,897,890</td>
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<tr>
<td>Scientist:</td>
<td>S.E. Scheideler</td>
</tr>
<tr>
<td>Description:</td>
<td>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.</td>
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**Biological Systems Engineering**

<table>
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<tr>
<th>Patent Title:</th>
<th>Method and apparatus for production of levulinic acid via reactive extrusion</th>
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<tbody>
<tr>
<td>Patent Number:</td>
<td>5,859,263</td>
</tr>
<tr>
<td>Scientists:</td>
<td>V. Ghorpade and M.A. Hanna</td>
</tr>
<tr>
<td>Description:</td>
<td>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.</td>
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</table>
**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. Graefelman.

**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.

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**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.

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**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.
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
Don S. Blank, McCook
Chuck Hassebrook, Walthill
Drew Miller, Papillion

Nancy O’Brien, Waterloo
Kent Schroeder, Kearney
Rosemary Skrupa, Omaha
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

Vice Chancellor
Irvin T. Omtvedt

Associate Vice Chancellor
Edna L. McBreen

Assistant Vice Chancellor
Finance and Personnel
Alan R. Moeller

Dean
Agricultural Research Division
Darrell W. Nelson*

Dean
College of Agricultural Sciences and Natural Resources
Donald M. Edwards

Interim Dean
College of Human Resources and Family Sciences (IANR Research and Extension)
Rita Kean

Interim Dean
Cooperative Extension Division
Elbert Dickey**

Director
Conservation and Survey Division
Mark S. Kuzila

Director
International Programs
Arlen Etling

*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

<table>
<thead>
<tr>
<th>Unit</th>
<th>Head/Chair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Economics</td>
<td>Jeffrey Royer, Head</td>
</tr>
<tr>
<td>Agricultural Leadership, Education and Communication</td>
<td>Earl Russell, Head</td>
</tr>
<tr>
<td>Agronomy</td>
<td>Kenneth Cassman, Head</td>
</tr>
<tr>
<td>Animal Science</td>
<td>Donald Beermann, Head</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>Robert Klucas, Head</td>
</tr>
<tr>
<td>Biological Systems Engineering</td>
<td>Glenn Hoffman, Head</td>
</tr>
<tr>
<td>Biometry</td>
<td>David Marx, Chair</td>
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<tr>
<td>Entomology</td>
<td>Z B Mayo, Head</td>
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<tr>
<td>Food Science and Technology</td>
<td>Steven Taylor, Head</td>
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<tr>
<td>Horticulture</td>
<td>David Lewis, Head</td>
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<tr>
<td></td>
<td>Garald Horst, Interim Head</td>
</tr>
<tr>
<td></td>
<td>Plant Pathology</td>
</tr>
<tr>
<td></td>
<td>Anne Vidaver, Head</td>
</tr>
<tr>
<td>School of Natural Resource Sciences</td>
<td>Blaine Blad, Director</td>
</tr>
<tr>
<td></td>
<td>Ted Elliott, Director</td>
</tr>
<tr>
<td>Veterinary and Biomedical Sciences</td>
<td>Jack Schmitz</td>
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#### Human Resources and Family Sciences Departments

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<tr>
<th>Department</th>
<th>Chair/Interim Chair</th>
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</thead>
<tbody>
<tr>
<td>Family and Consumer Sciences</td>
<td>Shirley Baugher, Chair</td>
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<tr>
<td></td>
<td>Judy Johnson, Interim Chair</td>
</tr>
<tr>
<td>Nutritional Science and Dietetics</td>
<td>Marilyn Schnepf, Chair</td>
</tr>
<tr>
<td>Textiles, Clothing and Design</td>
<td>Rita Kean, Chair</td>
</tr>
<tr>
<td></td>
<td>Pat Crews, Interim Chair</td>
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</table>

#### Off-Campus Research Centers

<table>
<thead>
<tr>
<th>Center</th>
<th>Director</th>
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</thead>
<tbody>
<tr>
<td>Agricultural Research and Development Center</td>
<td>Daniel Duncan, Director</td>
</tr>
<tr>
<td>Northeast Research and Extension Center</td>
<td>John Witkowski, Director</td>
</tr>
<tr>
<td>Panhandle Research and Extension Center</td>
<td>Charles Hibberd, Director</td>
</tr>
<tr>
<td>South Central Research and Extension Center</td>
<td>Alan Baquet, Director</td>
</tr>
<tr>
<td>Southeast Research and Extension Center</td>
<td>Randy Cantrell, Director</td>
</tr>
<tr>
<td>West Central Research and Extension Center</td>
<td>Gary Hergert, Director</td>
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#### Interdisciplinary Centers

<table>
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<tr>
<th>Center</th>
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<tbody>
<tr>
<td>Biotechnology Center</td>
<td>Anne Vidaver, Director</td>
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<tr>
<td>Food Processing Center</td>
<td>Steven Taylor, Director</td>
</tr>
<tr>
<td>Center for Grassland Studies</td>
<td>Martin Massengale, Director</td>
</tr>
<tr>
<td>Great Plains Regional Center for Global Environmental Change</td>
<td>Shashi Verma, Director</td>
</tr>
<tr>
<td>Industrial Agricultural Products Center</td>
<td>Milford Hanna, Director</td>
</tr>
<tr>
<td>Center for Rural Community Revitalization and Development</td>
<td>John Allen, Director</td>
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<tr>
<td>Center for Sustainable Agricultural Systems</td>
<td>Chuck Francis, Director</td>
</tr>
<tr>
<td>Water Center/Environmental Programs</td>
<td>Edward Vitzthum, Interim Director</td>
</tr>
<tr>
<td>IANR Communications and Information Technology</td>
<td>Dan Cotton, Director</td>
</tr>
</tbody>
</table>

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1. Ended appointment during 1999-2000
2. Began 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

<table>
<thead>
<tr>
<th>Rank</th>
<th>Rsch</th>
<th>Ext</th>
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<th>Other</th>
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<tbody>
<tr>
<td><strong>Agricultural Economics</strong></td>
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<tr>
<td>Jeffrey S. Royer</td>
<td>Professor</td>
<td>0.52</td>
<td>0.18</td>
<td>0.30</td>
<td>Head, Center for Rural Community, Revitalization and Development; Rural Sociology</td>
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<tr>
<td>John C. Allen</td>
<td>Professor</td>
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<tr>
<td>J. David Aiken</td>
<td>Professor</td>
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<td>Azzeddine Azzam</td>
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<td>Research and Quantitative Methods, Industrial Organization of Food Processing</td>
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<td>Maurice E. Baker</td>
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<td>Oscar Burt</td>
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<td>Lilyan Fulginiti</td>
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<tr>
<td>Konstantinos Giannakas</td>
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<td>Glenn A. Helmers</td>
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<td>Bruce B. Johnson</td>
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<td>H. Douglas Jose</td>
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<td>Bettina Klaus</td>
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<td>E. Wesley F. Peterson</td>
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| John E. Barbuto, Jr. | Assistant Professor | 0.25 | 0.25 | 0.50 | Leadership Development |
| O.S. Gilbertson | 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 | | Distance Education Policy |

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2 Began research appointment during 1999-2000
3 Began head position during 1999-2000
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<td>Mary Ellen Rider</td>
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<tr>
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**Nutritional Science and Dietetics**

<table>
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<td>Marilyn Schnepf</td>
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<tr>
<td>Julie A. Albrecht</td>
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<tr>
<td>Timothy Carr</td>
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<tr>
<td>Judy Driskell</td>
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<tr>
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<td>Fayrene Hamouz</td>
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<td>Nancy M. Lewis</td>
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<td>Kaye Stanek</td>
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**Textiles, Clothing and Design**

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<tr>
<td>Patricia Cox Crews</td>
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<td>Interim Chair, Textile Conservation and Science</td>
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<tr>
<td>Rita C. Kean</td>
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<td>Joan Laughlin</td>
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<tr>
<td>Shirley M. Niemeyer</td>
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<tr>
<td>Lois Scheyer</td>
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<td>Industrial Use of Agricultural Products</td>
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1. Ended research appointment during 1999-2000
2. Began research appointment during 1999-2000
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<tr>
<td>John F. Witkowski</td>
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<tr>
<td>Michael C. Brumm</td>
<td>Professor</td>
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<td>Animal Science (Swine Production)</td>
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<tr>
<td>Thomas E. Hunt</td>
<td>Assistant Professor</td>
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<tr>
<td>Stevan Knezevic</td>
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<tr>
<td>William L. Kranz</td>
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<tr>
<td>Terry L. Mader</td>
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<td>Animal Science (Beef Cattle)</td>
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<tr>
<td>Charles A. Shapiro</td>
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<tr>
<td>David F. Shelton</td>
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<tr>
<td>Charles A. Hibberd</td>
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<tr>
<td>Burton A. Weichenthal</td>
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<tr>
<td>David D. Bahensperger</td>
<td>Professor</td>
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<td>Agronomy (Crop Breeding)</td>
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<tr>
<td>Jurg M. Blumenthal</td>
<td>Assistant Professor</td>
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<td>Agronomy (Soil Fertility)</td>
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<tr>
<td>Dillon M. Feuz</td>
<td>Associate Professor</td>
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<td>Agricultural Economics (Farm/Ranch Management)</td>
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<td>Dale M. Grotelueschen</td>
<td>Professor</td>
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<td>Veterinary and Biomedical Sciences (Diagnostic)</td>
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<tr>
<td>Bob Harveson</td>
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<td>Plant Pathology</td>
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<tr>
<td>Gary L. Hein</td>
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<tr>
<td>Drew J. Lyon</td>
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<tr>
<td>Alexander D. Pavliska</td>
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<tr>
<td>Patrick E. Reece</td>
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<td>Agronomy (Range and Forage)</td>
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<tr>
<td>Ivan G. Rush</td>
<td>Professor</td>
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<tr>
<td>John A. Smith</td>
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<tr>
<td>Robert G. Wilson</td>
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<tr>
<td>C. Dean Yonts</td>
<td>Associate Professor</td>
<td>0.50</td>
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<td>Biological Systems Engineering (Irrigation)</td>
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| 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) |

1Began research appointment during 1999-2000

39
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  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\textsuperscript{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\textsuperscript{1}  Professor  0.12  0.13  0.75  Assistant Director
Steven S. Waller  Professor  0.50  0.50  Assistant Dean and Director; NCSARE Coordinator

\textsuperscript{1}Ended research appointment during 1999-2000
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 Elsaaawi  
  **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 Snowder  
  **Country:** United States/Montana  
  **Expertise/Discipline:** Animal genetics

#### Biochemistry

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

- **Visiting Scientist:** Fazoi Ataullahanov  
  **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 bacteriology

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

<table>
<thead>
<tr>
<th>Research Associate</th>
<th>State/Country</th>
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<tbody>
<tr>
<td>John Brejda</td>
<td>Oklahoma, USA</td>
<td>Collection and evaluation of native legumes and forbs</td>
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<tr>
<td>Tony Buhr</td>
<td>Nebraska, USA</td>
<td>Gene expression in transgenic soybean</td>
</tr>
<tr>
<td>Anita Dieleman</td>
<td>Canada</td>
<td>Soil, topology, and pest site characterization data; herbicide treatment maps</td>
</tr>
<tr>
<td>Daniel Ginting</td>
<td>Minnesota, USA</td>
<td>Site-specific manure application</td>
</tr>
<tr>
<td>Julie Huddle</td>
<td>Texas, USA</td>
<td>Long-term vegetation in the Nebraska Sandhills; blowout penstemon</td>
</tr>
<tr>
<td>Anabayan Kessavalou</td>
<td>India</td>
<td>Site-specific manure application</td>
</tr>
<tr>
<td>Gopal Krishnan</td>
<td>India</td>
<td>Weed management in corn and soybeans</td>
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<tr>
<td>Won Jong Lee</td>
<td>Korea</td>
<td>End-use quality of wheat/effects of environment on bread and noodle properties</td>
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<tr>
<td>Lijia Li</td>
<td>China</td>
<td>Maize chromosome-specific libraries and probes</td>
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<tr>
<td>Mark Liebig</td>
<td>Nebraska, USA</td>
<td>Evaluation of soil quality indicators on long-term cropping systems</td>
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<tr>
<td>R.K. Pandey</td>
<td>India</td>
<td>Cooperating with INTSORMIL on sorghum and nitrogen research</td>
</tr>
<tr>
<td>Chris Neesser</td>
<td>Canada</td>
<td>Plant patch dynamics to address weed problems in agroecosystems</td>
</tr>
<tr>
<td>Gilbert Meyer-Gauen</td>
<td>Germany</td>
<td>Nuclear-mitochondrial genetic interactions</td>
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<tr>
<td>Mohammad Maroof Shah</td>
<td>Pakistan</td>
<td>Wheat molecular cytogenetics</td>
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<tr>
<td>Brian Rector</td>
<td>Georgia, USA</td>
<td>Genetic mapping of soybean traits</td>
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#### Animal Science

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<tbody>
<tr>
<td>Kari Elo</td>
<td>Finland</td>
<td>Animal genetics</td>
</tr>
<tr>
<td>Mohammad M. Ahsan</td>
<td>Bangladesh</td>
<td>Molecular genetics</td>
</tr>
<tr>
<td>Mohammad Anwaruzzaman</td>
<td>Bangladesh</td>
<td>Biochemistry</td>
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#### Biochemistry

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<tr>
<td>Mohammad M. Ahsan</td>
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<td>Molecular genetics</td>
</tr>
<tr>
<td>Mohammed Anwaruzzaman</td>
<td>Bangladesh</td>
<td>Biochemistry</td>
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</tbody>
</table>
| Research Associate: | Sander Arendsen  
State/Country: | The Netherlands  
Expertise/Discipline: | Biochemistry  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Tapan Kumar Kundu  
State/Country: | India  
Expertise/Discipline: | Biophysics/spectroscopy  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Sarbani Chakraborty  
State/Country: | Nebraska, USA  
Expertise/Discipline: | Biochemistry  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Shubhong Liu  
State/Country: | China  
Expertise/Discipline: | Virology  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Sanchita Roy Chowdhury  
State/Country: | India  
Expertise/Discipline: | Molecular biology  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Nilesh Maiti  
State/Country: | India  
Expertise/Discipline: | Biochemistry  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Shantanu Chowdhury  
State/Country: | India  
Expertise/Discipline: | Metallobiochemistry  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Eugene Mosharov  
State/Country: | Russia  
Expertise/Discipline: | Biochemistry  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Long-Ying Dong  
State/Country: | Japan  
Expertise/Discipline: | Plant biochemistry and molecular biology  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Devendra Naidu  
State/Country: | India  
Expertise/Discipline: | Microbiology  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Qiujiang Du  
State/Country: | China  
Expertise/Discipline: | Molecular biology  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Mamt Naidu  
State/Country: | India  
Expertise/Discipline: | Molecular immunology  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Yu-Chun Du  
State/Country: | China  
Expertise/Discipline: | Biochemistry  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Kuljeet Singh  
State/Country: | India  
Expertise/Discipline: | Bioinorganic chemistry  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Natalia Ermolova  
State/Country: | Russia  
Expertise/Discipline: | Plant biochemistry  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Ming Tan  
State/Country: | China  
Expertise/Discipline: | Molecular biology  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Naduparambil K. Jacob  
State/Country: | India  
Expertise/Discipline: | Molecular biology  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Chao Wei  
State/Country: | China  
Expertise/Discipline: | Molecular biology  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Konstantin Korotkov  
State/Country: | Russia  
Expertise/Discipline: | Biochemistry  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Jianmin Wu  
State/Country: | China  
Expertise/Discipline: | Molecular biology  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Boris Kornilaev  
State/Country: | Russia  
Expertise/Discipline: | Biochemistry  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Youbin Xiang  
State/Country: | China  
Expertise/Discipline: | Molecular biology  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Konstantin Korotkov  
State/Country: | Russia  
Expertise/Discipline: | Biochemistry  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Michael Scharf  
State/Country: | Indiana, USA  
Expertise/Discipline: | Insecticide toxicology  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Srinivas Parimi  
State/Country: | India  
Expertise/Discipline: | Insecticide toxicology  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Sudha Krishna  
State/Country: | India  
Expertise/Discipline: | Microbiology  
|-------------------|-----------------|-----------------|------------------|
| Research Associate: | Srinivas Parimi  
State/Country: | India  
Expertise/Discipline: | Insecticide toxicology  
|-------------------|-----------------|-----------------|------------------|

**Entomology**
### School of Natural Resource Sciences

<table>
<thead>
<tr>
<th>Research Associate</th>
<th>State/Country</th>
<th>Expertise/Discipline</th>
</tr>
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<tbody>
<tr>
<td>Brian Cabrera</td>
<td>California, USA</td>
<td>Termite biology</td>
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<tr>
<td>Xiaomao Lin</td>
<td>Nebraska, USA</td>
<td>Instrumentation/meteorology</td>
</tr>
<tr>
<td>Rezaul Mahmood</td>
<td>Oklahoma, USA</td>
<td>Modeling/climatology</td>
</tr>
<tr>
<td>Junhua Zhu</td>
<td>Louisiana, USA</td>
<td>High pressure liquid chromatography-mass spectrometry</td>
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<tr>
<th>Research Associates</th>
<th>State/Country</th>
<th>Expertise/Discipline</th>
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<tbody>
<tr>
<td>Israrul Ansari</td>
<td>India</td>
<td>Virology</td>
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<td>Yunquan Jiang</td>
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<td>Molecular biology</td>
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<td>Delin Liang</td>
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<td>Virology microbiology</td>
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<tr>
<td>Daniel Perez</td>
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<td>Biochemistry</td>
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<td>Xiaoli Liu</td>
<td>China</td>
<td>Ophthalmology, cataract</td>
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<td>Kostyantyn Krysan</td>
<td>Ukraine</td>
<td>Molecular biology</td>
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<td>Ventzislav B. Vassilev</td>
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<td>Molecular biology</td>
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<tr>
<td>Yang Zhang</td>
<td>China</td>
<td>Molecular endocrinology</td>
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### Veterinary and Biomedical Sciences

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<tr>
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<tr>
<td>Ofelia Chacon</td>
<td>Columbia</td>
<td>Pathobiology/microbiology - veterinary medicine</td>
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<tr>
<td>Emil Berberov</td>
<td>Russia</td>
<td>Microbiology/genetics</td>
</tr>
<tr>
<td>Xiaoxing Cheng</td>
<td>Switzerland</td>
<td>Microbial genetics/pathogenesis</td>
</tr>
<tr>
<td>Parmod K. Mehta</td>
<td>India</td>
<td>Immunology</td>
</tr>
<tr>
<td>Mustapha Moulay Samrakandi</td>
<td>France</td>
<td>Microbiology</td>
</tr>
<tr>
<td>Israrul Ansari</td>
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<td>Molecular endocrinology</td>
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</table>
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.

### Type
- Hatch
- Regional Research
- State
- McIntire-Stennis
- Special Grant
- Competitive Grant
- Animal Health

### Funding Source
- Federal and State Funds
- Federal Funds
- State Funds
- Federal Funds
- Federal, State, Public and Private Funds
- Federal Funds/USDA
- Federal Funds

### Code
- Ha
- Rr
- St
- Ms
- Cg
- 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  ln Factors affecting the evolution of world agricultural markets: implications for U.S. policy (E.W. Peterson)
10-124  ln Economic analysis of farm management and public policy alternatives for improving groundwater quality (R.J. Supalla, J.C. Allen)
10-125  ln 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  ln Technical efficiency analysis for livestock and dairy operations in Nebraska (A.M. Azzam, S.M. Azzam)
10-131  ln 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  ln 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  ln Measurement and explanation of the competitiveness of the United States in the markets for beef, soy (L.E. Fulginiti)
<table>
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<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
<th>Year</th>
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<tbody>
<tr>
<td>10-139</td>
<td>Rural sustainability: the relationship between community structure, agricultural structure and social class</td>
<td>J.C. Allen</td>
<td>1993</td>
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<td>10-140</td>
<td>The measurement of efficiency in resource use in rural areas: a stochastic frontier analysis (S.M. Cordes, A.M. Azam, J.C. Allen)</td>
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<td>1994</td>
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<td>10-142</td>
<td>Competitiveness and value added in the U.S. grain and oilseed industry (D. Conley)</td>
<td></td>
<td>1995</td>
</tr>
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</table>

### Agricultural Leadership, Education and Communication

| 24-031 | Impacting agricultural literacy of elementary students and teachers through teacher workshops (O.S. Gilbertson) | 1993 |
| 24-033 | Distance education policy research: organization and administration (J.W. King, S.K. Rockwell, E.B. Russell) | 1995 |
| 24-034 | Predictors of leader and follower behavior, and the impact of leadership development (J.E. Barbuto Jr., S. Fritz) | 1996 |

### Agronomy

| 12-002 | Improvement and evaluation of oats and barley (P.S. Baenziger) | 1993 |
| 12-055 | Genetics, breeding and evaluation of common wheat and triticale for Nebraska (P.S. Baenziger) | 1994 |
| 12-149 | Breeding sorghum and pearl millet for USA and developing countries (D.I. Andrews) | 1995 |
| 12-181 | Development of profitable reduced herbicide weed management systems through integration (A.R. Martin) | 1996 |
| 12-193 | Investigating alternative grain and oil crops for Nebraska (L.A. Nelson) | 1997 |
| 12-194 | Novel methods for soybean genetic improvement and genomic analysis (J.E. Specht) | 1993 |
| 12-197 | Tissue and cell physiology of sorghum (M.D. Clegg) | 1994 |
| 12-198 | Jasmonate regulated gene expression in soybean (P.E. Staswick) | 1995 |
| 12-201 | Maintenance, increase and distribution of elite germplasm (R. Helsing) | 1996 |
| 12-204 | Biological and ecological basis for a weed management model to reduce herbicide use in corn (D.A. Mortensen, J.L. Lindquist) | 1993 |
| 12-215 | Development of integrated weed management strategies to improve Great Plains and Midwest grasslands (R.A. Masters) | 1994 |
| 12-225 | Studies on the mechanisms found in corn, sorghum and pearl millet which improve N uptake and use (J.W. Maranville) | 1995 |
| 12-227 | Perennial forage grass breeding for Nebraska (K.P. Vogel) | 1996 |
| 12-238 | Management for sustained production of perennial warm-season grasses (W.L. Schacht) | 1997 |
| 12-241 | Ecological studies of Nebraska range-land vegetation (J. Stubbendieck) | 1993 |
| 12-242 | Defining and assessing basic indicators of soil quality and productivity (J.W. Doran, J.E. Gilley, J.R. Ellis, G.E. Varvel) | 1994 |
| 12-243 | Weed distribution and demography: elucidating pest management principles for reducing herbicide use (D.A. Mortensen) | 1995 |
| 12-244 | Soil physical relationships for best management practices to protect water quality (W.L. Powers) | 1996 |
| 12-246 | Efficient and environmentally sound conservation use of nutrients and C from animal manure (J.W. Doran, J.E. Gilley) | 1994 |
| 12-252 | Biosolids application and soil chemical properties: changes in phosphorus and carbon pools (D. McCallister) | 1996 |
| 12-253 | Characterizing nitrogen mineralization and availability in crop systems to protect water resources (D.H. Sander, D.T. Walters) | 1997 |
| 12-254 | Community structure and functional diversity of soil microbial communities in natural and agroecosystems (R.A. Drijber) | 1993 |
| 12-255 | Soybean breeding and genetic studies (G.E. Graef) | 1994 |
| 12-256 | Stability of soil microbial communities under different agroecosystems (R.A. Drijber) | 1995 |
| 12-259 | Nutrient management for maximizing nutrient use efficiency in sorghum (J.W. Maranville) | 1996 |
| 12-260 | Assessment of genetic variation for end-use quality traits in soybean (D. Lee) | 1994 |
| 12-266 | Molecular characterization and manipulation of the wheat genome for crop improvement (K.S. Gill) | 1996 |
| 12-269 | Cropping systems for uncertain environments: decision aids for managing soil and weather variability (R.M. Caldwell) | 1995 |
| 12-270 | Molecular characterization of a major gene cluster of wheat (K.S. Gill) | 1996 |
| 12-271 | IPM implementation in a corn/soybean/cotton/wheat system (D.A. Mortensen) | 1994 |
| 12-272 | Germination, growth, and development of selected perennial forage grasses (L.E. Moser) | 1995 |
| 12-273 | Selecting wheat and other cereal grains for enhanced end-use performance characteristics (D.R. Shelton, P.S. Baenziger, R.A. Graybosch) | 1996 |
| 12-274 | Physiological bases of environmental constraints on plant growth and productivity (T.J. Arklebauer) | 1997 |
| 12-275 | Marketing and delivery of quality cereals and oilseeds (D.R. Shelton) | 1995 |
| 12-276 | Gene chips for economically important plants and animals (K. Gill, D. Pomp, K. Arumuganathan, P. Staswick) | 1996 |
| 12-277 | Quantitative genetics with focus on corn breeding and corn germplasm improvement (W.K. Russell) | 1995 |
| 12-278 | Dynamic nitrogen management strategies for optimizing maize yield and N use efficiency (D.T. Walters) | 1996 |
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  ln  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  ln  Genetic variation for reproduction and energy utilization (M.K. Nielsen)
13-104  ln  Optimizing the utilization of dietary fiber and lipids by dairy cows (R.J. Grant)
13-105  ln  Nutrition of prolific sows (A.J. Lewis, P.S. Miller)
13-110  rr  Molecular mechanisms regulating skeletal muscle growth and differentiation (S.J. Jones)
*13-118  ln  Factors affecting calcium transport in the avian small intestine and egg shell quality (S.S. Scheideler)
*13-119  ln  Nitrogen metabolism in Prevotella ruminicola: a molecular genetics approach (M. Morrison)
13-120  ln  Testicular modulation of luteinizing hormone secretion (R.J. Kittok, J.E. Kinder, H.E. Grotjan)
13-122  ln  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  ln  Physiological and management aspects of expression of estrus and ovulation rate in swine (D.R. Zimmerman)
13-127  ln  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  ln  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 adhesion 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  ln  Recombinant bovine and equine gondotropins (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  ln  Molecular biology of protein degradation and utilization by Prevotella ruminicola (M. Morrison)
13-139  ln  Regulation of gonadotropin synthesis and secretion, ovarian follicular development and testicular function pre- and post-puberty (J.E. Kinder)
13-140  ln  Role of adipose tissue in determining energy utilization in cattle (J.L. Miner)
13-141  ln  Nutritional management strategies for sustainable feedlot cattle production (T. Milton, T.J. Klopfenstein, T.L. Mader)
13-142  ln  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  ln  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  ln  Factors affecting calcium utilization in the avian and egg shell quality (S.E. Scheideler)
13-147  rr  Interrelationships among liver metabolism, nutrient intake, and growth criteria in growing-finishing barrows and gilts (P.S. Miller, A.J. Lewis)
13-148  ln  Improving the efficiency of nitrogen and amino acid utilization by pigs (A.J. Lewis, P.S. Miller)
13-150  ln  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  ln  Hemoglobins in higher plants (R.V. Klucas)
15-078  hh  Genetic modification of chloroplast rubisco (R.J. Spreitzer)
15-080  hh  Characterization of human telomerase (C.M. Price)
15-081  lh  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  ln  Regulation of transcription in plastids of higher plants (L.A. Allison)
15-086  ln  B12 enzymes and hyperhomocysteinemia (R. Banerjee)
15-087  rr  Regulation of photosynthetic processes (R. Chollet, J.P. Markwell, R.J. Spreitzer)
15-088  ln  Enzymology of anaerobic CO fixation and bioremediation (S. Ragsdale)
15-089  cg  Rubisco phylogenetic correction (R.J. Spreitzer)
15-090  hh  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. Levitieus)
11-044  rr  Improvement of thermal processes for food (M.A. Hanna)
11-079  ln  Agricultural tractor testing board: policies and procedures (L.L. Bashford, M.F. Kocher, R.D. Grisso)
11-097  ln  Protein film production and evaluation (C.L. Weller)
11-099  ln  Improving field productivity and predicting energy requirements of soil-engaging equipment (R.D. Grisso, M.F. Kocher, L.L. Bashford)
11-102  ln  Identification, modeling, and design of plant sensor systems for variable-rate chemical application (G.E. Meyer)
Biometry

23-001 st Applications of statistics to research in agriculture (D.B. Marx, W.W. Stroup, A.M. Parkhurst, K. Esdrige)

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. Paparonzi)

11-076 cg Detaching internal insect infestation in wheat by near-infrared spectroscopy (R.L. Wehling)

16-077 ln Genes and biochemistry of stress-response systems in gram-positive bacteria and food-born pathogens (A.K. Benson)

16-078 ln Evaluation and characterization of antioxidants from plant sources (S.L. Cappett)

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. Wyhe)

16-080 ln 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 fuscum mycotoxins in cereal foods (L.B. Bullerman, M.A. Hanna, M.M. Casteo)

16-085 sg CCP identification and validation during poultry production and processing (M.M. Brashears, S.R. McKee, E.A. Walbank-Pendleton)

Entomology

*17-047 rr Spatial dynamics of leaffopper pests and their management on alfalfa (S.D. Danielson)

17-054 ln 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.B. Thomas, J.J. Petersen, S.R. Skoda)

17-062 ln Arthropods associated with buffalo grass and other turfgrasses in Nebraska (F.P. Bazendale)

*17-063 ln Stress-cereal crop interactions and development of resistant cultivars (S.S. Quisenberry)

17-064 ln Host-plant resistance, insect genetics, and biological studies of cereal insects (J.E. Foster)

17-067 ln The influence of shelterbelts and alfalfa on natural enemies of the bean leaf beetle, Cerotoma trifurcata (Forster) in soybeans (S.D. Danichson)

17-068 ln 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 ln Bio-intensive pest management of the greenbug (Z B Mayo)

17-071 ln Development of resistance management techniques for corn insect pests in Nebraska (B.D. Siegfried)

17-072 ln 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 ln Starch technology: production, characterization, and utilization (D.S. Jackson)

16-054 ln Chemical and physical quality characteristics of horticultural crops and their products (D.A. Smith)

16-055 ln Food allergies and sensitivities (S.L. Taylor, S.L. Hefle)

16-056 ln Mold and mycotoxin hazards in foods, feeds and the environment (L.B. Bullerman)

16-065 ln Genetics and physiology of Streptococcus thermophilus and other lactic acid bacteria (R.W. Hutkins)

16-066 ln Analytical methods for food process control and measurement of processing induced changes (R.L. Wehling)

*16-068 cg Fate of furonisim B, in heat processed corn products (L.B. Bullerman, M.A. Hanna)

16-069 ln 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)

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 ln Influence of sulfur and nitrogen on the growth and development of ornamental plants (E.T. Paparonzi)

20-050 ln Cultural practices to minimize environmental stress on vegetable crop production and physiology (L. Hodges, J.R. Brandle)
Plant Pathology

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

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

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

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

21-056 ln
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 Heteroder pratylenchus and associated nematodes in the North Central Region (T.O. Powers, E.D. Kerr)

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

21-063 ln
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 ln
Leaf rust virulence in Nebraska and management systems for turfgrass diseases (J.E. Watkins)

21-070 ln
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 fly 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 ln
Environmental effects on plant host-parasite interactions (J.E. Partridge)

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

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

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

21-077 st
Detection of seedborne bacteria and characterization of bacterial endophytes (A.K. Vidaver)

School of Natural Resource Sciences

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

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

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

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

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

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

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

27-007 ln
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 ln
Relationships between remotely-sensed spectral properties of vegetated surfaces and biophysical properties (E.A. Walter-Sha)

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 ln
Climate change and the winter wheat agroecosystem: experiments and modeling (A. Weiss)

27-017 ln
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.C. Watts)

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

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

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

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

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

40-005 ln
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 ln
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. Selkumaran)
Research laboratory and animal care facility (J.A. Schmitz, A. Hogg, T.E. Socha)

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. Groothuesch)

*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 herpes virus 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 cholerasuis (R.W. Wills, P.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 diarrhea 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 enteroxin-1 in diarrhea and septicemia in swine (R.A. Moxley, R.G. Barletta)

14-102 ln
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. Carillo)

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 diarrhea virus translation (R.O. Donis, C.L. Kelling)

14-107 ln
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 ln
Epidemiology of Escherichia coli 0135:H4 and salmonella in feedlot beef cattle (D.R. Smith, R.A. Moxley, L.L. Hungerford, J.T. Gray, T.J. Klopfenstein)

14-1099 cg
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 ln
Impact of Head Start on rural children, families, and communities (P.D. Zeece)

92-022 ln
Retirement economic well-being for women in Nebraska and cross-culturally (S.L. Cramer)

92-023 ln
Economic well-being of Nebraska household: a comparison of alternative measures (E.P. Davis)

92-025 ln
Family functioning of interracially constituted families (S. Baugher)

92-026 ln
Surviving and transcending a traumatic childhood (J.D. DeFrain)

92-028 ln
High hopes and bright futures: successful teens in Nebraska (D.A. Abbott, W.H. Meredith)

92-029 ln
The impact of welfare reform on women's lives: education, job placement/retention, and resource management (K. Proehaska-Cue, B. Sparks)

92-030 ln
Economic impact of HIV/AIDS on Nebraskans (M.E. Rider)

92-032 ln
The new relational perspective in developmental psychology and its applications to education and child care (C.P. Edwards)

92-033 ln
Into the heartland: a contextual examination of migration and its impacts on rural Nebraskan meat-packing communities (R.L. Dallas)

92-034 ln
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. Proehaska-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 ln
Exercise dependence and disordered eating behaviors: instrument development validation and testing (N.M. Betts)

91-047 ln
The metabolic basis of atherosclerosis (T.P. Carr)

91-048 ln
The use of edible films and natural antioxidants to control warmed-over flavor in meats (M. Schnepp)

91-049 ln
Nutritional knowledge, practices, beliefs of caregivers and practices of physicians for young children (K.L. Stanek)

91-050 ln
Health implications of folate and homocysteine as it relates to fruit and vegetable consumption (J.A. Allreight)

91-051 ln
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)
Situational and personal factors in residential waste management: the impacts of markets, resources, and attitudes (S.M. Niemeier)

Family business interaction of work and family spheres (R.C. Kean)

Development of textile end-uses for wheat gluten and other farm commodity derived materials (L.E. Hamilton)

Development of textile materials for environmental compatibility and human health and safety (P.C. Crews)

Impacts of environmental disclosure policies and constraints on housing transaction practices (S. Niemeier)

Development of textile materials for environmental compatibility and human health and safety (L. Scheyer)

Environmental compatibility and human health and safety (L. Scheyer)

Panhandle Research and Extension Center

Fertilizer and manure application for production of continuous corn (D.D. Baltensperger)

Weed control systems for western Nebraska irrigated crops and rangeland (R.G. Wilson)

Feed resources and beef production systems in western Nebraska to optimize total efficiency (J.G. Rush, B.A. Weichenthal)

Agricultural enhancement of potato production and utilization (A.D. Pavlota)

Improvement of proso millet and other crops for western Nebraska (D.D. Baltensperger)

Agrichemical control in irrigation runoff water from surface irrigated fields (C.D. Yonts, G.R. Wilson)

The economics of alternative beef cattle marketing and feeding strategies (D.M. Feuz)

Machinery systems management for sugarc beets, dry edible beans, and chicory (J.A. Smith, R.G. Wilson)

Plant germplasm and information management and utilization (D.D. Baltensperger)

Intensification of winter wheat based dryland cropping systems for western Nebraska (B.J. Lyon)

Taking advantage of winter wheat protein premium through late-season nitrogen fertilization (J.M. Blumenthal, D.M. Feuz, E.D. Kerr)

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)

Integrated management systems for arthropod pests of wheat and other crops in western Nebraska (G.L. Hein)

Romant Hruska U.S. Meat Animal Research Center

Development and operation of the U.S. Meat Animal Research Center (D. Lasta)

Management of arthropod pests of livestock and poultry (J.B. Campbell, C.D. Thomas)

Management practices to improve reproduction of beef heifers (G.H. Deutscher)

Genotype by environment interactions for sow productivity and early piglet growth (T.E. Long)

Grazing management strategies and systems for Sandhills meadows (J.D. Volesky)

West Central Research and Extension Center

Sorghum and corn breeding and corn, sorghum, and wheat variety evaluation under central Nebraska environment conditions (P.T. Nordquist)

Selection and development of native herbaceous landscape plants (D.T. Lindgren)

Improving the profitability and sustainability of Sandhills beef cattle operations (R.T. Clark)

Biology, ecology, economics and control of major insects affecting cattle in Nebraska (J.B. Campbell)

Production systems and nutrition for Sandhills and Northern Great Plains range (D.C. Adams)

Management of arthropod pests of live-st ock and poultry (J.B. Campbell, G.D. Thomas)

Genotype by environment interactions for sow productivity and early piglet growth (T.E. Long)

Grazing management strategies and systems for Sandhills meadows (J.D. Volesky)
### Interdisciplinary Activities

#### Administration

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>01-001</td>
<td>General administration of federal fund research (D. W. Nelson)</td>
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<tr>
<td>01-004</td>
<td>Regional research coordination, North Central Region (D. W. Nelson)</td>
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#### Agricultural Research and Development Center

<table>
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<td>45-001</td>
<td>Field Laboratory development (D. Duncan)</td>
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#### Center for Grassland Studies

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<tr>
<td>33-001</td>
<td>Center for grassland studies (M. A. Massengale)</td>
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#### Food Processing Center

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<th>Code</th>
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<tr>
<td>19-003</td>
<td>Development and evaluation of food products, processes and markets (S. L. Taylor)</td>
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<tr>
<td>19-004</td>
<td>Midwest food manufacturing alliance (S. L. Taylor)</td>
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<tr>
<td>19-008</td>
<td>Development and quality/safety enhancement of specialty food products (S. L. Taylor)</td>
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### Center for Sustainable Agriculture Systems

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<th>Code</th>
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<tr>
<td>31-002</td>
<td>Center for sustainable agricultural systems (C. A. Francis)</td>
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<tr>
<td>31-003</td>
<td>Biological and economic consequences of flexible crop rotations (C. A. Francis)</td>
</tr>
<tr>
<td>31-004</td>
<td>Integrated crop/livestock research for sustainable systems (C. A. Francis, T. J. Klopfenstein, J. R. Brandle)</td>
</tr>
<tr>
<td>31-005</td>
<td>Integrated crop/livestock/agroforestry research for sustainable systems in Nebraska (T. J. Klopfenstein, J. R. Brandle, C. A. Francis)</td>
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### Industrial Agricultural Products Center

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<td>29-007</td>
<td>Industrial agricultural products center (M. A. Hanna)</td>
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<tr>
<td>29-008</td>
<td>Biodegradable plastics from corn starch and soybean oil (M. A. Hanna, V. Miladinov)</td>
</tr>
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</table>
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
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 Economic 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
FEBS 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 Leadership, Education and Communication Journal Articles


Agronomy Journal Articles


Agricultural Leadership, Education and Communication


Agronomy Journal Articles


Research Publications (1999)

Agricultural/ Natural Resources Units

Agricultural Economics

Journal Articles


Book Chapters


Research Bulletins


Referred Proceedings


**Book Chapters**


**Refereed Proceedings**


Animal Science

Journal Articles


Zhao, F. 1999. The effects of dietary essential fatty acids supplementation on laying hen performance, egg yolk fatty acid profile, and egg functional properties. (S.E. Scheideler, Advisor)


Biochemistry

Journal Articles


Mechanism of transfer of the methyl group from (6S)-methyltetrahydrofolate to the corrinoid/iron-sulfur protein catalyzed by the methyltransferase from Clostridium thermoaceticum: a key step in the Wood-Ljungdahl pathway of acetyl-CoA synthesis. Biochemistry 38:5728-5735. (J. Series No. 12622)

Binding of (6R,S)-methyltetrahydrofolate to methyltransferase from Clostridium thermoaceticum: role of protonation of methyltetrahydrofolate in the mechanism of methyl transfer. Biochemistry 38:5736-5745. (J. Series No. 12640)

Questions about the complexity of chloroplast ribulose-1,5-bisphosphate carboxylase/oxygenase. Photosynthesis Research 60:29-42. (J. Series No. 12486)

Redox regulation of cell signaling by selenocysteine in thiorodoxin reductases. Journal of Biological Chemistry 274:24522-24530. (J. Series No. 12660)

Characterization of the home and pyridoxal phosphate cofactors of human cystathionine γ-synthase reveals nonequivalent active sites. Biochemistry 38:2738-2744. (J. Series No. 12446)

Assignment of enzymatic functions to specific regions of the P.L.F. dependent heme protein cystathionine β-synthase. Biochemistry 38:13155-13161. (J. Series No. 12591)

Par1, a nuclear localized protein that regulates phosphorous metabolism in Chlamydomonas reinhardtii. Proceedings of the National Academy of Science 96:15336-41. (J. Series No. 12708)

Identification of IgE-binding region in soybean acidic glcinin G1. Journal of Food and Agricultural Immunology 11:83-90. (J. Series No. 11948)


Book

Book Chapters

Ragsdale, S.W. 1999.

Ragsdale, S.W. 1999.

M.S. Theses
Duan, W. 1999.
Regulation of expression of the kaposi's sarcoma associated herpesvirus/human herpesvirus-8 early gene ORF57. (C.A. Wood, Advisor)

Characterization of a family of sigma-like factors from Zoos Mys. (L.A. Allison, Advisor)

Ph.D. Dissertation
Biochemistry of carbon monoxide dehydrogenase/acetyl-CoA synthase complex and heterodisulfide reductase from methanosaerica thermophila: key enzymes involved in acetoclastic methanogenesis. (S.W. Ragsdale, Advisor)

Biological Systems Engineering
Journal Articles


Zein: properties, preparation, and applications. Food Science and Biotechnology 8:1-10. (J. Series No. 12484)

Predicting soil detachment from high-discharge concentrated flow. Transactions of the American Society of Agricultural Engineers 42:329-335. (J. Series No. 12106)

Diffusion of dialkylnitrosamines into the rat esophagus as a factor in esophageal carcinogenesis. Carcinogenesis 20:825-836. (J. Series No. 12749)

Physical and molecular properties of egg-white-lipid lipids. Journal of Food Science 64:860-864. (J. Series No. 12504)

Identification of IgE-binding region in soybean acidic glcinin G1. Journal of Food and Agricultural Immunology 11:83-90. (J. Series No. 11948)


Phosphorus and nitrogen in runoff following beef cattle manure or compost application. Journal of Environmental Quality 28:1201-1210. (J. Series No. 12487)

Phosphorus and nitrogen in runoff following beef cattle manure or compost application. Journal of Environmental Quality 28:1201-1210. (J. Series No. 12487)

Rheological properties of amorphous and semicrystalline polyactic acid polymers. Industrial Crops and Products 10:47-53. (J. Series No. 12253)

Predicting soil detachment from high-discharge concentrated flow. Transactions of the American Society of Agricultural Engineers 42:329-335. (J. Series No. 12106)


Zein: properties, preparation, and applications. Food Science and Biotechnology 8:1-10. (J. Series No. 12484)

Predicting soil detachment from high-discharge concentrated flow. Transactions of the American Society of Agricultural Engineers 42:329-335. (J. Series No. 12106)

Phosphorus and nitrogen in runoff following beef cattle manure or compost application. Journal of Environmental Quality 28:1201-1210. (J. Series No. 12487)

Rheological properties of amorphous and semicrystalline polyactic acid polymers. Industrial Crops and Products 10:47-53. (J. Series No. 12253)

Predicting soil detachment from high-discharge concentrated flow. Transactions of the American Society of Agricultural Engineers 42:329-335. (J. Series No. 12106)


Zein: properties, preparation, and applications. Food Science and Biotechnology 8:1-10. (J. Series No. 12484)

Predicting soil detachment from high-discharge concentrated flow. Transactions of the American Society of Agricultural Engineers 42:329-335. (J. Series No. 12106)

Physical and molecular properties of egg-white-lipid lipids. Journal of Food Science 64:860-864. (J. Series No. 12504)


Referred Proceedings


Book Chapters


M.S. Thesis

Spare, D.P. 1999. Effects of copper and zinc in swine diets on phototrophic anaerobic lagoons. (J.E. Gilley, Advisor)

Ph.D. Dissertations


Fang, Qi. 1999. Preparation and characterization of starch-based loose-fill packaging foams. (M.A. Hanna, Advisor)


Biometry

Journal Articles


Entomology

Journal Articles


somenentation process for recombinant production by Pichia pastoris.
soy protein-fatty acid composite filin-fonningsolutions.
Effect of cycling temperatures on the activity of zearalenone by cell culture technique. Food Science and Agricultural Immunology 11:83-90. (J. Series No. 11948)

Book Chapters


The starch characteristics of elhow corn. (L.B. Bullerman, Advisor)

Effect of cycling temperatures on the production of deoxynivalenol and zearalenone by Fusarium graminearum NRRL 5893. Journal of Food Protection 62:1451-1455. (J. Series No. 12211)

Measurement of the estrogenic activity of zearalenone by cell culture technique. Food Science and Biotechnology 8:227-231. (J. Series No. 12431)


Fumonisin B1 production by Fusarium moniliforme and Fusarium proliferatum as affected by cycling temperatures. Journal of Food Protection 62:1456-1460. (J. Series No. 12207)


MS. Theses

The effects of heat stress and vitamin E supplementation on egg quality. (S. McKee, Advisor)

Lemlich, D. 1999.
The starch characteristics of elbow macaroni as impacted by dough moisture content, mixing time, and cooking time. (D.S. Jackson, Advisor)

Heat stability of monodiform in corn. (L.B. Bullerman, Advisor)

Ph.D. Dissertations

Stability of mycotoxins in thermally processed corn products. (L.B. Bullerman, Advisor)

Dormedy, E.S. 1999.
Implementation and microbial verification of HACCP systems and HACC intervention methods in meat processing establishments for the reduction of food-borne pathogens. (M.M. Brashears and A.K. Benson, Advisors)

Fang, Qi. 1999.
Preparation and characterization of starch-based loose-fill packaging foams. (M.A. Hanna, Advisor)

Grant, P.J. 1999.
Different heating techniques for oat lipase stabilization: Grain quality and storability. (R.I. Wehling, Advisor)

Ma, Fangrui, 1999.
Biodiesel fuel: the transesterification of beef tallow. (M.A. Hanna and L.D. Clements, Advisors)

O’Dwyer, M. 1999.
Gelsolin: an investigation of its distribution and function in bovine skeletal muscle. (M.G. Zeece, Advisor)

Horticulture

Journal Articles


Native wildflower establishment with imidazolone herbicides. HortScience 34:283-286. (J. Series No. 12180)

Grassland legume establishment with imazehapyr and imazapic. Agronomy Journal 91:592-596. (J. Series No. 12297)

Nitrogen and sulfur effects on leaf lettuce quality. Journal of Food Quality 22:363-373. (J. Series No. 120129)

A device to measure turfgrass load bearing capacity under field conditions. Crop Science 39:1516-1517. (J. Series No. 11161)


Influence of Rhipes nigrograndis (Ashmead) (Hymenoptera: Encyrtidae) on the buffalo grass meallings, Tridex sporoideus (cuckool) and Tryonimus sp. Environmental Entomology 28:123-127. (J. Series No. 12216)


M.S. Thesis

Plant Pathology

Journal Articles


M.S. Thesis

Plant Pathology

Journal Articles


Journal Articles


Referred Proceedings


Book Chapters


Veterinary and Biomedical Sciences

Journal Articles

Fumonisin B1, a mycotoxin contaminant of cereal grains, induces Apoptosis via the tumor necrosis factor pathway and caspase activation but does not require p53. Food and Chemical Toxicology 37:703-712. (J. Series No. 12378)


Activation of caspases and p53 by bovine herpesvirus 1 infection results in programmed cell death and efficient virus release. Journal of Virology 73:3778-3789. (J. Series No. 12421)

Development of a transposon mutagenesis system for Mycobacterium avium subsp. paratuberculosis. FEMS Microbiology Letters 175:21-26. (J. Series No. 12545)


Fatal outbreaks of proliferative enteropathy caused by Lactococcus intracellularis in young colony-raised rhesus macaques. Journal of Medical Primatology 28:11-18. (J. Series No. 12325)

Effects of supplementation of organic and inorganic combinations of copper, cobalt, manganese, and zinc above nutrient requirement levels of postpartum two-year-old cows. Journal of Animal Science 77:522-532. (J. Series No. 12162)

Hyphal defects and mammalian tumors induced by Ras from a phytopathogenic fungus. Molecular and General Genetics 262:46-54. (J. Series No. 12230)

Williams, S.L., N.B. Harris, and R.G. Barletta, 1999.

Bovine herpesvirus-1 can infect CD4+ T lymphocytes and induce programmed cell death during acute infection of cattle. Journal of Virology 73:8657-8668. (J. Series No. 12579)

The mycotoxin Fumonisin B1 transcriptionally activates the p21 promoter through a cis-acting element containing two Sp1 binding sites. Journal of Biological Chemistry 274:12367-12371. (J. Series No. 12442)

Book Chapters


M.S. Theses

Pasteurella haemolytica leukotoxin: Interaction with host cellular receptor (S. Srikumaran, Advisor)

Molecular virology (C.J. Jones, Advisor)

Epidemiology of bovine leukemia virus (D.R. Smith, Advisor)

Ph.D. Dissertations

Studies on the biology of porcine reproductive and respiratory syndrome (PRRS) virus infection. (F.A. Osorio, Advisor)

Molecular genetic analysis of D-cycloserine resistance in mycobacteria. (R.G. Barletta, Advisor)

Modulation of latency of pseudorabies virus by commercial vaccines. (F.A. Osorio, Advisor)

Devireddy, L.R. 1999.
Analysis of transcription and latency of alpha herpes viruses: Identification of a neuronal-specific latency-related transcript that promotes latency and a cellular transcription factor that stimulates immediate early transcription. (C.J. Jones, Advisor)

Fengyn, Q. 1999.
Lenthio transferase: Purification, characterization and physiological roles. (M.F. Lou, Advisor)

Down-regulation of bovine major histocompatibility complex I molecules by bovine herpes virus 1. (S. Srikumaran, Advisor)

Zhang, P. 1999.

Human Resources and Family Sciences Departments

Family and Consumer Sciences

Journal Articles

The role of gender in the presentation of mental health clinicians in the movies: Implications for clinical practice. Psychotherapy: Theory/Research/Practice/Training 36:180-189. (J. Series No. 12505)
Books


Refereed Proceedings


M.S. Theses

Dobosh, A.M. 1999. Credit card practices of undergraduate college students. (E.R. Combs, Advisor)


Journal Articles


Ph.D. Dissertations


Nutritional Science and Dietetics

Books


Book Chapters


Textiles, Clothing and Design

**Journal Articles**


**Ph.D. Dissertation**


Off-Campus Research Centers

Northeast Research and Extension Center

**Journal Articles**


**Ph.D. Dissertation**


Panhandle Research and Extension Center

**Journal Articles**


**Ph.D. Dissertation**


**Ph.D. Dissertation**

Journal Articles


Research Bulletin


Ph.D. Dissertation

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

<table>
<thead>
<tr>
<th>Federal Formula Funds:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatch Formula</td>
<td>$2,311,502</td>
</tr>
<tr>
<td>Regional Research</td>
<td>$654,540</td>
</tr>
<tr>
<td>McIntire-Stennis</td>
<td>$136,805</td>
</tr>
<tr>
<td>Animal Health</td>
<td>$137,805</td>
</tr>
<tr>
<td><strong>Total Federal Formula Funds</strong></td>
<td>$3,240,652</td>
</tr>
</tbody>
</table>

| State Appropriated Funds                   | $25,976,723 |

| Nebraska Research Initiative Funds         | $2,242,853  |

<table>
<thead>
<tr>
<th>Contracts and Grants:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>USDA Cooperative Agreements</td>
<td>$1,167,609</td>
</tr>
<tr>
<td>USDA Special and Competitive Grants</td>
<td>$3,603,557</td>
</tr>
<tr>
<td>Federal Grants - (NSF, NIH, USEPA, AID, DOE)</td>
<td>$5,029,841</td>
</tr>
<tr>
<td>Industry Grants</td>
<td>$8,222,493</td>
</tr>
<tr>
<td><strong>Total Grants and Contract</strong></td>
<td>$18,023,500</td>
</tr>
</tbody>
</table>

| Product Sales                              | $6,881,758  |

| Total Expenditures                         | $56,058,995 |

$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**

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

<table>
<thead>
<tr>
<th>Category</th>
<th>FY 1998</th>
<th>FY 1999</th>
<th>FY 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Information:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projects at beginning of year</td>
<td>387</td>
<td>368</td>
<td>399</td>
</tr>
<tr>
<td>Projects terminating</td>
<td>57</td>
<td>23</td>
<td>42</td>
</tr>
<tr>
<td>Projects revised</td>
<td>11</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>New projects</td>
<td>38</td>
<td>54</td>
<td>26</td>
</tr>
<tr>
<td>Projects at the end of the year</td>
<td>368</td>
<td>399</td>
<td>383</td>
</tr>
<tr>
<td><strong>Faculty full-time equivalents (FTE)</strong></td>
<td>130.8</td>
<td>129.9</td>
<td>130.4</td>
</tr>
<tr>
<td><strong>Expenditures for budgeted research faculty:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal formula and state approp., $/FTE¹</td>
<td>$239,650</td>
<td>$258,582</td>
<td>$241,259</td>
</tr>
<tr>
<td>Grant and contracts, $/FTE</td>
<td>$116,030</td>
<td>$135,262</td>
<td>$138,217</td>
</tr>
<tr>
<td>Product sales, $/FTE</td>
<td>$ 58,127</td>
<td>$ 51,357</td>
<td>$ 52,774</td>
</tr>
<tr>
<td><strong>Outputs from research programs²:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refereed journal articles</td>
<td>289</td>
<td>274</td>
<td>327</td>
</tr>
<tr>
<td>Research bulletins</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Books and book chapters</td>
<td>49</td>
<td>68</td>
<td>45</td>
</tr>
<tr>
<td>M.S. and Ph.D. theses</td>
<td>136</td>
<td>148</td>
<td>115</td>
</tr>
<tr>
<td>Cultivars and germplasm released</td>
<td>7</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>Patents obtained</td>
<td>5</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

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.