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# Agricultural Research Division 113th Annual Report 1999

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# Agricultural Research Division

University of  
Nebraska

July 1, 1998 - June 30, 1999

113th  
Annual  
Report

Charting a path...  
Pioneering the future



**On the cover:** The cover image illustrates the Agricultural Research Division's logo: Pioneering the Future. The sextant represents ARD's rich tradition of significant contributions to the world's scientific knowledge. The vastness of space represents the limitless opportunities ARD has to pioneer the future in scientific research in the new millennium.

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# Table of Contents

Our Mission .....	2
Foreword .....	3
Research Highlights .....	4
Faculty Awards and Recognitions .....	12
Graduate Student Awards and Recognitions .....	14
Undergraduate Honors Student Research Program .....	16
Variety and Germplasm Releases .....	17
Copyrights and Patents .....	21
Administration .....	22
Administrative Personnel .....	22
Organizational Chart .....	23
Administrative Units Reporting to ARD .....	24
IANR Research Facilities .....	25
Faculty .....	26
Agricultural/Natural Resources Units .....	27
Human Resources and Family Sciences Departments .....	34
Off-Campus Research Centers .....	35
Interdisciplinary Activities .....	36
Visiting Scientists and Research Associates .....	38
Research Projects .....	42
Agricultural/Natural Resources Units .....	42
Human Resources and Family Sciences Departments .....	47
Off-Campus Research Centers .....	48
Interdisciplinary Activities .....	49
Publications .....	50
Agricultural/Natural Resources Units .....	54
Human Resources and Family Sciences Departments .....	70
Off-Campus Research Centers .....	71
Research Expenditures .....	74

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## **Our Mission**

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

# Foreword

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Darrell W. Nelson

It is a pleasure to provide you with a copy of the 113th 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 you will agree with our assessment that ARD research has provided new technology and knowledge for Nebraskans which 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, 1998 to June 30, 1999. 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) development of improved cultivars of wheat, great northern beans, grain sorghum, penstemon, and pearl millet; (ii) advances in basic research related to wheat genetics, protein biochemistry, and photosynthesis; (iii) development of methods to detect bovine viral diarrhea in newborn calves and *E. coli* 0157:H7 in pens of feedlot cattle; (iv) improvement in processes for making tortillas from Nebraska corn and for cooking bacon for use as a sandwich condiment; (v) development of a drought-monitoring tool and best management practices for reducing runoff of atrazine from corn fields; and (vi) completion of a poll to track views, concerns, and needs of rural residents.

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

Darrell W. Nelson  
Dean and Director  
Agricultural Research Division

# Research Highlights

**T**he 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.

## New skin test detects BVD in newborn calves

A simple test developed by an IANR veterinary scientist will help cattle producers determine if newborn calves are infected with a virus that causes a devastating disease.

Bovine Viral Diarrhea (BVD) costs U.S. cattle producers \$150 million annually. Symptoms include diarrhea and a suppressed immune system, leading to other serious infections.

BVD virus spreads from animal to animal in a herd. When the virus infects a pregnant cow, it passes to the fetus. The fetus's immune system isn't developed enough to recognize the virus as an infection. By the

time the immune system matures, the virus has become a natural part of the calf's system — a persistent, unrecognizable infection.

A persistently infected animal isn't common but can be difficult to detect and can devastate a herd by infecting others. Producers can lose up to 10 percent of the calves born in a herd from severe diarrhea and concurrent infections.

Until now, the only sure way to determine persistent BVD infection has been blood tests of calves 3 months or older. The IANR test, a variation of an existing method, uses a skin sample — a small notch from a calf's ear — and can be used on calves soon after birth. The skin test is more accurate than blood testing. It allows producers to identify infected calves



Brett Hampton

*Veterinary Scientist Bruce Brodersen found that using a skin test accurately detects calves infected with Bovine Viral Diarrhea even hours after birth, months earlier than blood tests. Here he takes a small notch from a calf's ear for the skin test.*

and remove them from the herd sooner, reducing the chance of infecting other animals.

## Agronomists identifying nitrogen-efficient sorghum lines

Sorghum growers could reduce production costs with two new nitrogen-efficient sorghum lines identified by IANR agronomists.

The sorghum lines, or strains, use nitrogen 25 percent more efficiently than most sorghum lines used as parents for hybrid varieties but yield about the same. That translates into lower nitrogen fertilizer costs and more money in the grower's pocket.

Nitrogen-use efficiency refers to the number of pounds of grain produced for each pound of nitrogen the plant uses. Most U.S. sorghum lines produce about 40 pounds of grain per pound of nitrogen,

compared to 50 pounds of grain with the new lines.

IANR researchers estimate growers could save as much as \$3 per acre or more on nitrogen fertilizer if the new lines are used to produce more efficient hybrids.

The lines were identified through INTSORMIL, a U.S. Agency for International Development cooperative research program headquartered at NU. The program gives IANR scientists access to international sorghum germplasm. In 1995, an NU agronomist identified the lines when he was screening newly acquired Chinese sorghum lines for nitrogen-use efficiency.

Both lines are adapted to Nebraska growing conditions. One has earlier maturity, which makes it suitable to western and central Nebraska. IANR scientists are studying the genetics of the lines before releasing them to commercial plant breeders. Hybrids made from the new varieties are a few years away yet.

## New technique speeds sorting of chromosomes

Creating a genetic map of plant chromosomes is an arduous but crucial step toward identifying and harnessing genes that control important traits, such as seed weight, yield or disease resistance.

An IANR molecular biologist's new technique for sorting wheat chromosomes should speed the process. His NU team is the first to use the technique in plants.

They're using it to map chromosomes so they eventually can locate genes responsible for useful traits. Once pinpointed, such genes can be cloned and wheat breeders can use them to develop plants with desirable traits.

Chromosome mapping is a long, tedious process because of the sheer amount of material to be mapped. Less than 1 percent of chromosome material contains genes, and of those 70,000 to 80,000 genes, only about 1,000 are of interest to crop scientists.

Wheat chromosomes have two arms, a long and a short. Through years of genetic studies, the NU geneticist located a cluster of about 40 useful genes on the short arm of one of the 21 wheat chromosomes. He combined this information with his knowledge of a specialized aneuploid wheat line. This aneuploid line is normal except for a single chromosome that has only the small arm — the one carrying the useful genes. The lack of a long arm makes this

chromosome drastically smaller than a normal chromosome.

His technique involves using the NU Center for Biotechnology's Flow Cytometry Core Facility. A flow cytometer sorts tiny particles according to size. It's a quick, simple way to sort out small, short-arm-only chromosomes like the ones with the useful gene cluster from other chromosomes.

This technique allows the team to sort batches of chromosomes to 95 percent purity, or 95 percent short-arm chromosomes, reducing lab work almost 60-fold.

## New dry bean fend off multiple diseases

A new great northern bean cultivar developed by IANR plant breeders offers multiple disease resistance not found in any commercially available variety.

The new cultivar, named Weihing, combines resistance to fungal, bacterial and viral diseases. It has a more upright growth habit that reduces the chance of white mold disease. Add to this package larger, brighter seed than the standard great northern variety and it's easy to see why growers in Nebraska and Idaho are showing great interest in Weihing.

In disease-free fields, Weihing matches top commercial varieties in yields and outyields them when disease is present. Weihing resists rust, a fungus; common bacterial blight and halo blight, both bacterial diseases; and BCMV, a virus.

Weihing was developed by IANR's dry bean breeding team at Lincoln, North Platte and Scottsbluff, and is a joint release of NU's Agricultural Research Division and USDA's Agricultural Research Service. Certified seed will be available to growers in spring 2000.

## State's first white wheat variety available soon

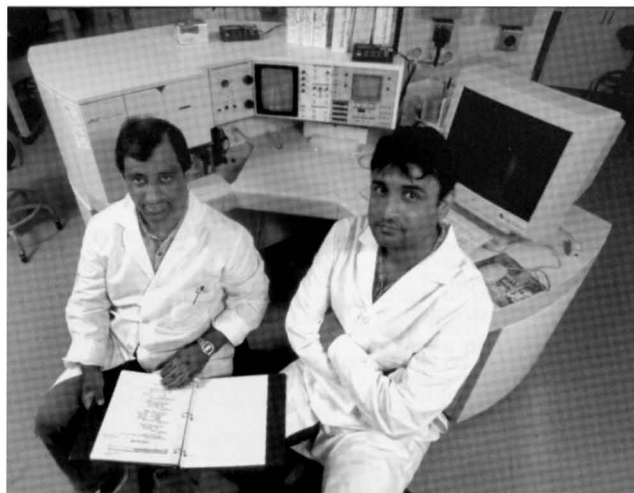
NU's first release of a hard white winter wheat variety gives Nebraska's growers a chance to expand into new markets.

Hard white wheat flour is used to make whole wheat breads and Asian noodles. The new variety, named Nuplains, is the first white wheat adapted to Nebraska conditions and gives the state's growers a chance to produce for this growing market.

IANR wheat breeders teamed with USDA Agricultural Research Service scientists to develop Nuplains, which should be available to farmers for planting in fall 2000. Nuplains is a dual purpose wheat, with good bread baking quality and above-average quality for noodles. Equally important for wheat growers in Nebraska and other Plains states, Nuplains is the most winter-hardy white wheat available.

Nuplains produces yields similar to the Nebraska hard red winter wheat variety Arapahoe and is somewhat less winter hardy than NU varieties Alliance and Arapahoe. It is moderately resistant to stem rust disease and moderately susceptible to current races of leaf rust.

A White Wheat 2000 committee, composed of representatives from IANR, state agencies and wheat growers, is educating growers, elevator operators and others about white wheat's production, handling and potential.



Brett Hampton

*Molecular Geneticist Kulvinder Gill (right) and K. (Aru) Arumuganathan, manager of the Flow Cytometry Core Facility at NU's Center for Biotechnology, use the flow cytometer to sort wheat chromosomes according to size. Gill came up with the chromosome sorting technique, which should speed genetic mapping of chromosomes. The NU team is the first to use it in plants.*



## Pass the salsa ... making tortillas, chips from Nebraska corn

An IANR food scientist is cooking up new ways to use Nebraska corn.

In a specialized, small-scale NU processing plant, researchers test the quality of tortillas made from Nebraska corn. Matching Nebraska corn to Latin America's huge appetite for tortillas and chips would open a major market for the state's farmers.

Consumers prefer tortillas made from specialty white corn types, which have a harder kernel than yellow corn. Nebraska produces more white corn than any other state, almost 17 million bushels in 1998, or 20 percent of the U.S. crop.

But most specialty corn stays in the U.S. chip and tortilla market. Latin American countries buy the more abundant No. 2 yellow food-grade corn, but it's too soft for their tastes — it doesn't cook right, is too yellow and makes poorer quality tortillas.

IANR researchers are testing ways to produce better tortillas from Nebraska white and yellow food-grade corn.

Results will help tortilla and chip manufacturers in two ways: by showing that Nebraska specialty corn produces the high quality product they need, and by providing processing information about ways to produce better tortillas from yellow corn.



Research Technician Maria Buendia Gonzolez and IANR Food Scientist David Jackson check a fresh batch of tortillas made with Nebraska corn in Jackson's lab. The tortillas are part of Jackson's research on the best methods for making quality tortillas and chips from Nebraska corn.

## IANR team helps develop drought monitoring tool

IANR researchers at the National Drought Mitigation Center helped develop a new drought tracking system launched in summer 1999.

The new Drought Monitor is an easily understood, Web-based tool for tracking widespread droughts. It highlights emerging trouble spots for various state and federal agencies that can help reduce drought's effects. It's designed for drought and water planners and policy-makers but could be of interest to anyone.

The Drought Monitor combines several drought and water indices in a single, simple map showing where drought is emerging, lingering and subsiding around the United States. It shows how drought is affecting agriculture, wildfire danger and water supplies.

It's among the latest products of efforts to improve drought monitoring nationwide and characterize its severity. This information is used to coordinate drought planning and response at the federal and state levels.

The center collaborated with the USDA and the National Oceanic and Atmospheric Administration on this project. IANR staff designed the Drought Monitor Web site, which the center maintains at NU.

The National Drought Mitigation Center, established in 1995, aims to help reduce society's vulnerability to drought. The center's research aids drought planning, forecasting, monitoring, risk assessment and coordination. IANR researchers at the center work with federal, state and local governments on drought monitoring and planning.

## Some tillage practices significantly cut atrazine runoff

Water that runs off fields in southeast Nebraska may eventually run out of drinking water taps in Kansas City. NU and Kansas State University researchers have teamed in research to reduce non-point source runoff pollution that can affect drinking water in Kansas.

The project focuses on how grain producers in the 9,700-square-mile Blue River Basins area of southeast Nebraska and northeast Kansas use and apply herbicides. Herbicide runoff from fields can contain levels of atrazine and sediments that can contaminate Kansas' Tuttle Creek Reservoir, a major drinking water source for Kansas City, Topeka and other Kansas communities.

IANR surface water management researchers collected atrazine runoff data in the Nebraska basin from 1994-1997 and used it in a computer model that evaluated atrazine losses from three common tillage practices. Computer modeling helped researchers determine which herbicide management and tillage practices farmers can use to reduce the amount of atrazine runoff from fields.

Early results indicate certain practices could reduce annual atrazine runoff by 50 percent or more. They are: using pre-emergent incorporation with broadcast application at planting or post-emergent

broadcast application four weeks after planting with disk-till; using pre-emergent band application at planting and post-emergent broadcast application with ridge-till; or post-emergent broadcast application with slot plant.

The team is sharing its findings with farmers to encourage the use of best management practices to reduce the potential for atrazine runoff and increase use of sediment control practices.

## New screwworm test should save time, money

A fast, simple test that accurately detects screwworms, a potential deadly animal parasite, should aid international eradication efforts.

USDA-Agricultural Research Service entomologists at NU developed the test. It's part of an ongoing research effort in the world's

only screwworm research rearing station, which USDA-ARS operates at NU.

The test can be used worldwide to identify suspected screwworms. It should save time and money in the battle against screwworms.

This ELISA, or enzyme-linked immunosorbant assay, accurately determines if a suspect fly, larva, pupa, egg or fly part actually is a screwworm. It's easy to use, more than 99 percent accurate and provides answers within three hours.

Previously, suspects had to be shipped to a laboratory for initial identification. That meant a long, anxious wait for officials who might have to launch expensive measures to quell re-infestation if the suspect proved to be a screwworm.

Screwworm larvae feed and grow in wounds of warm-blooded animals. Untreated infestations can be deadly. Before being eradicated from the United States in the late 1970s, screwworms devastated

the southern U.S. livestock industry, costing hundreds of millions annually.

Researchers raise and study screwworms in a biologically secure facility at NU to find ways to identify, control and eliminate them. Part of the USDA-ARS Midwest Livestock Insects Research Unit at NU, this research supports international screwworm eradication efforts. The USDA entomologists are adjunct IANR faculty and work closely with IANR researchers and graduate students.

## Many women need better retirement savings strategies

Many Nebraska women need to heed the sage advice to save early and consistently, preferably through a solid retirement savings plan including employer-provided benefits.

An IANR family economist studied retirement habits and patterns of Nebraska women ages 30-61. She found that many Nebraska women aren't adequately preparing for retirement. Her findings highlight several areas ripe for financial education programs.

Respondents had saved an average of only \$8,000. More than a third of those surveyed considered investments such as collectibles and gold, silver or gems the top two personal savings categories. Forty-four percent indicated they were counting on an inheritance to carry them through retirement. About half of younger respondents cashed in retirement

benefits, losing a chance for savings to compound.

Twenty-eight percent of the Nebraska women had Individual Retirement Accounts and 22 percent had mutual funds, both retirement income builders. That's lower than in some other states, probably because the Nebraska women listed what they saved, not what they expected as retirement income sources.

Women live longer and depend on personal savings, employer-provided and Social Security benefits more than men. Since women typically earn about 30 percent less than men, their retirement and Social Security checks are correspondingly lower.

## Research shows teens need help to succeed

Parents, other adults and peers can help teen-agers succeed academically, avoid risky behaviors and minimize familial conflict, IANR research shows.

Two IANR College of Human Resources and Family Sciences family scientists surveyed 300 high-achieving Nebraska high school upper-classmen to determine why many said "no" to risky business.

Ninety-eight percent of teen respondents said they haven't used illegal drugs, 90 percent said they haven't had sexual intercourse, 83 percent don't smoke cigarettes and 60 percent don't drink alcohol.

The teens surveyed had earned grade point averages of



Brett Hampton

USDA-Agricultural Research Service Entomologist Dennis Berkebile and Technologist Julia Russ check adult screwworm flies in a one-of-a-kind, biologically secure screwworm research rearing station at NU. This lab's research supports an international screwworm eradication effort.

3.5 or higher and participated in school and community activities. They were selected from scholarship winner lists and groups such as 4-H.

Parents of these high-achieving teens spend time with them and know their kids' pals and whereabouts, the study found. Teens reported extracurricular activities developed their self-confidence. Both parents and teens said other adults, especially teachers, coaches, clergy, relatives and peers, participate in the teens' lives. Both generations often cited religious involvement as part of the teens' success.

Researchers plan to expand the survey sample to 500 Nebraska teens and chart their college success in two and four years.

## Improved pearl millet offers feed grain alternative

IANR plant breeders have developed an improved pearl millet feed grain hybrid that thrives in heat and moisture stress which would stop sorghum in its tracks.

Pearl millet, an ancient tropical cereal grown for food in India and West Africa, is a potential feed grain alternative in hot, dry, short-seasoned areas of the Great Plains, such as western Nebraska. In eastern Nebraska, it offers a late planting or replanting option. South and east of Nebraska, it could be a second crop.

Traditional pearl millet is tall, weak-stalked and low-

yielding by U.S. standards. NU breeders dwarfed the plant so it can be planted and harvested with sorghum equipment; strengthened its stalks to resist lodging; bred for early maturity; and improved yields by about 20 percent.

The result is a pearl millet that typically yields 50-70 bushels per acre — comparable to early sorghum — and matures about the same time. It produces multiple seed heads on strong stalks that withstand even snowstorms.

Pearl millet's feed value and performance are similar to corn for swine and cattle. Commercial tests show it outperforms corn or sorghum in poultry diets.

Two seed companies produced small amounts of hybrid seed for sale in 1999. Seed parents for those hybrids came from NU's 1998 limited release of seven parent lines



IANR Photo

*New grain-type pearl millet is growing in a field. IANR breeders developed improved pearl millet that could offer a feed grain option for western Nebraska and may be a late planting or second crop option in other areas.*

developed through IANR research.

While researching the grain-type pearl millet, IANR researchers also developed a new high-tonnage forage pearl millet. Cross-breeding produced vigorous, tall, leafy plants that don't head. These IANR-developed hybrids produced 15 percent more dry matter than commercially available forage pearl millet hybrids and 19 percent more than forage sorghums. A Texas company markets a forage pearl millet made with NU's forage millet male seed parent.

## Basic research could lead to more efficient plants

An NU biochemist's 18-year exploration of an enzyme that is the most abundant protein on earth is yielding information that may help scientists design more efficient crop plants.

The enzyme, ribulose-1-5-biphosphate carboxylase/oxygenase, commonly called Rubisco, is a key to the mysteries of photosynthesis. Rubisco is necessary for fixing CO<sub>2</sub> - taking CO<sub>2</sub> from the air and turning it into the carbon compounds that make up plants and become our food and clothing.

This IANR scientist is exploring ways to design a Rubisco that could fix more CO<sub>2</sub>. In crop plants, this could translate into higher yields with fewer expensive inputs, such as fertilizer.

Through a long process of screening tens of thousands of

colonies of the green algae *Chlamydomonas*, researchers found 10 algae carrying Rubisco mutants. These mutants are vital tools that enable scientists to study the genetics and structure of Rubisco and understand how this structure influences CO<sub>2</sub>-fixing efficiency.

One limit to Rubisco's efficiency is that it often mistakenly captures the much more abundant oxygen (O<sub>2</sub>) molecule, instead of CO<sub>2</sub>. While crop plants are better than *Chlamydomonas* at discriminating between CO<sub>2</sub> and O<sub>2</sub> they're slower at fixing CO<sub>2</sub>.

Having determined which parts of Rubisco are most important in discriminating between CO<sub>2</sub> and O<sub>2</sub>, researchers now are attempting to design a better enzyme by swapping parts of highly efficient enzymes for the slower, poorly discriminating parts.

## Poll tracks rural views, concerns and needs

Understanding rural Nebraskans' views, concerns and needs is important to effective public policy and planning. The Nebraska Rural Poll provides such information.

The annual poll, launched in 1996 by an IANR rural sociologist in NU's Center for Rural Community Revitalization and Development, provides a snapshot of rural views each year, and tracks trends and changes in rural attitudes and

behaviors over time. The mail survey is sent to about 7,000 randomly selected Nebraskans in the state's 87 rural counties. It's one of the largest surveys of its kind in the nation.

It asks rural Nebraskans about issues ranging from community and individual well-being to work and current policy issues. For example, the 1998 poll revealed mixed rural views about large farm operations. The 1999 survey queried rural residents about their preferences and expectations for their lives 20 years from now.

The 1999 poll showed many rural Nebraskans are less optimistic about their current and future situations than in recent years. This year's poll detected pessimism among certain Nebraskans, especially farmers and ranchers. Thirty-seven percent of farmers and ranchers said they were worse off than five years ago, up 17 percent from last year.

IANR researchers analyze poll results to provide a rural perspective on a range of issues. Analysis quantifies how rural Nebraskans as a whole and by group view different issues.

Federal, state and local policy-makers, lawmakers and rural communities use rural poll results to help with planning and decision-making. Policy-makers say the poll gives them a realistic picture of rural Nebraskans' needs and puts a human face on the state's rural residents.

## NU, NIH patent protein with cancer-fighting potential

The University of Nebraska and the National Institutes of Health have patented a protein that may help prevent some cancers and slow HIV/AIDS progression.

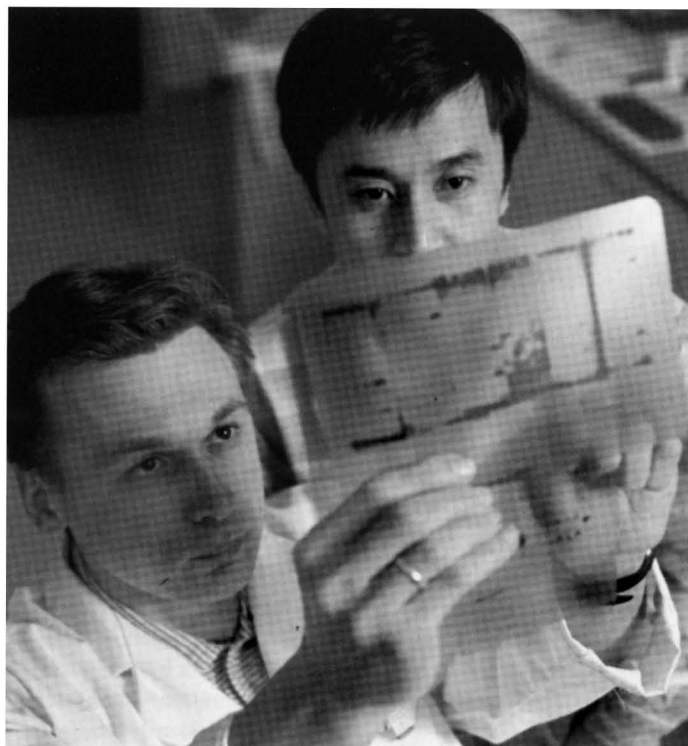
An IANR biochemist identified the previously unknown protein in 1996 while working at NIH. Since joining NU in 1998, he broadened his research. This newfound protein contains selenium, a trace element important for a healthy immune system.

Research elsewhere indicates selenium helps prevent prostate, colon and lung cancers and slows HIV/AIDS progression. The IANR team is researching its cancer-fighting potential at the biochemical or molecular levels.

They are studying prostate cancer because the protein's levels are highest in the prostate gland. Levels drop when cancer develops, reinforcing the biochemist's belief that supplemental dietary selenium could keep healthy cells from becoming cancerous.

If this and other research proves selenium's protective powers, people likely to develop certain cancers or those with HIV might be advised to take more selenium.

The NU team and collaborators also found genetic cancer-related mutations that might be responsible for decreased selenoprotein levels when cancer is present. The researchers



Brett Hampton

*IANR Biochemist Vadim Gladyshev identified a new selenoprotein that looks like a potential cancer-fighter. Gladyshev (left) and graduate student Qi-Au Sun check an immunoblot assay, which they use to analyze selenoprotein levels.*

will determine if the protein's mutations are directly associated with cancer and if they alter its performance or availability. If so, the protein could be used to develop diagnostic tests for cancer, especially prostate cancer.

## Insects get blasted with environmentally friendly controls

Imagine using plain water — with no insecticide added — to rid turf of damaging insects.

This and other environmentally friendly methods being studied by IANR entomologists may be the wave of the future in turfgrass pest control.

A six-year study by an interdisciplinary IANR research team focuses on two methods that attack insects where they live and do their damage — beneath the turf. One method uses equipment to slice grooves or punch holes in turf and insert insecticide. The other sprays liquid at very high pressure either onto the soil surface or as deep as 6 inches into the soil.

Both methods reduce the amount of pesticide used and place it beneath the soil, limiting the chance of pesticide contamination of the air or surface water.

The slicing technique uses either granular or liquid insecticide to control white grubs and black cutworms but can damage turf if overused.

The liquid injection method works two ways. Injecting liquid insecticide into the soil eliminated more than 90 percent of white grubs, the threshold necessary for a treatment to be useful.

To treat cutworms on the turf surface, nozzles sprayed plain water at pressures of up to 5,000 pounds per square inch. Only 56 percent of the cutworms were killed, even after two passes over the turf — not a high enough rate to be effective. Researchers hope to improve effectiveness by using closer nozzle spacing and increased pulse rates.

## Team developing tests to detect *E. coli* in cattle pens

Finding one animal carrying the potentially deadly *E. coli* 0157:H7 bacterium among hundreds in a feedlot is a rare event, IANR research shows. But that rare event is one way to prevent *E. coli* from contaminating beef food products.

In an effort to protect consumers and prevent huge beef recalls, IANR researchers are developing tests to detect *E. coli* 0157:H7 in feedlot cattle.

To study the bacterium and how it passes among cattle in feedlots, scientists must first find an animal carrying 0157:H7 and shedding it in its feces. After developing a protocol for testing animals, researchers tried it in feedlot conditions.

The bacterium truly is rare. After sampling the feces of 96

cattle in 12 pens at NU's Agricultural Research and Development Center near Mead every three weeks in the summer of 1998, researchers found only one animal shedding 0157:H7. It tested negative three weeks later.

Researchers are now developing a more sensitive protocol for testing whole pens of animals, rather than individuals, that will be more efficient and cost-effective.

In a related study, the team tested ways of decreasing bacteria levels in water tanks. Scrubbing and disinfecting troughs with bleach was the only method that significantly reduced bacterial levels, and only temporarily. Within 24 hours bacteria built up to pre-disinfection levels, showing that disinfection alone won't control *E. coli*.

Ultimately, researchers in veterinary and biomedical sciences, animal science and at NU's Great Plains Veterinary Educational Center want to identify feedlot management practices that will further reduce the number of cattle carrying the organism when they leave the feedlot.

This is part of NU's state-wide, interdisciplinary research effort that focuses on pre-harvest research, controlling *E. coli* at the farm, ranch and feedlot before animals reach processing plants. The Nebraska Legislature in 1998 passed LB1206 to help fund five years of *E. coli* research at NU. The Nebraska Beef Council and USDA also support this research.

## Windrow grazing a promising cost-cutter

Ranchers weary of baling, hauling and feeding hay have another option: leave the hay in windrows and let calves graze it.

Preliminary results of an NU forage study show that calves gain more weight grazing hay cut and left in windrows than eating baled hay from the same field. Windrow grazing also reduced production costs by eliminating the need to bale, haul and feed the hay.

Two years of IANR research in Sandhills subirrigated meadows show that weaned calves grazing windrows for 70 days averaged 531 pounds, compared to 507 pounds for calves in drylot pens eating baled hay. Average daily gain was 1.17 pounds for the windrow calves and .85 pounds for calves eating baled hay.

A forage scientist at NU's West Central Research and Extension Center says calves grazing windrows gained more weight because they also were able to graze high-quality grass that was available into December because of a mild autumn in 1997.

Wasted hay is the downside to windrows. Windrow grazing wasted 26 percent of the hay, compared to 12 percent in the drylots. Letting mature cows graze the trampled windrows reduced waste to a more acceptable 18 percent.

The windrow method doesn't completely eliminate ranch work — fences must be moved. Calves grazed up to two weeks on a fenced one-acre pasture, then the fence was moved to another acre. Still, moving the electric fence took much less time than baling, hauling and feeding hay.

## Leaner bacon requires new preparation methods

Today's leaner bacon is only 30 to 50 percent fat, down from the 60-70 percent fat that once sizzled in the pan.

Lower-fat bacon is pork producers' response to consumer demands for a leaner product. Now IANR animal science research is responding to producers' and the meat industry's needs by helping determine better ways to process and cook leaner bacon. This work comes amid a significant shift in bacon's use. These days bacon is more likely to adorn a fast-food sandwich than to share center of the plate status with over-easy eggs and toast. Use as a sandwich condiment creates new quality demands for bacon that is a consistent size and shape and doesn't curl up when cooked.

An IANR meat science team is focusing on how different factors affect a pig's leanness and on how leanness affects bacon processing and cooking. Their study used 1,590 pigs from six genetically different lines. They were fed diets containing varying protein amounts to slaughter weights of 250, 290 or 350 pounds. Bellies from these animals were evaluated for leanness and fat and cooked either on a conveyor belt or in a microwave, and then further studied.

Results of the study will influence how pigs are fed and raised, and could lead to changes in processing equipment in the quest for better bacon.

## A Few More Glimpses at ARD Research ...

- ❖ Weed management software developed by IANR scientists is being used to help manage weeds on more than 1 million crop acres. The software, called WeedSOFT, incorporates years of IANR research into a user-friendly program for making pre- and post-emergent weed management decisions for corn, soybeans and wheat. More than 500 farmers, crop consultants, agribusinesses and Cooperative Extension staff now use this decision management software. It's estimated that herbicide use has been reduced roughly 20 percent to 30 percent on acres where WeedSOFT is used.
- ❖ A new forage sorghum, called brown midrib, offers a viable dairy feed option, especially in drier climates. IANR animal science research shows that dairy cows fed brown midrib sorghum silage produced 10 more pounds of milk daily than those fed standard sorghum silage and about the same amount as those fed corn silage. Brown midrib might replace corn silage in drier regions better suited to sorghum than corn production. Brown midrib refers to the brown center of the plant stalk that normally is green or yellow-white. Brown midrib is more digestible than conventional sorghum because it contains less lignin.
- ❖ IANR's Veterinary Diagnostic Center has played an important role in the National Pseudorabies Eradication

Campaign to eliminate the disease from the nation's swine herds. The center is a leader in developing advanced pseudorabies detection and diagnostic techniques and was the first to offer some specialized tests. The advanced tests and procedures developed by NU veterinary scientists have helped regulators, veterinarians and producers make significant progress in the fight against pseudorabies. Many labs nationwide and abroad have adopted NU's tests and procedures.

- ❖ Heat stress contributes to the death of several thousand feedlot cattle annually nationwide and hurts the performance of many more. An IANR animal scientist at NU's Haskell Agricultural Laboratory near Concord, is coordinating a three-year, multi-state research project to better understand, predict and prevent heat stress in feedlot cattle. A major goal is developing management systems that warn feedlot operators of impending heat stress and offering specific recommendations that minimize or prevent cattle deaths and significant performance declines.
- ❖ Pruning windbreak tree roots improves soybeans' appearance and yields along field edges where they compete with trees for moisture. While windbreak benefits are well-known, some producers focus on the crop appearance and yields in this small competition zone, which extends into a field about one tree's height. Comparing dryland soybean yields in this competition zone with and without root pruning, researchers found pruning increased zone

yields 12-40 percent in dry years. They say root pruning doesn't make economic sense given the time and fuel required and because roots must be repruned every few years, but it is an option for producers worried about crop appearance and yields in the competition zone.

- ❖ Butter Bowl, a new NU-developed winter squash variety, features small, nearly round fruit with improved flesh flavor and texture. This novel butternut-type squash is about the size of an acorn squash but tastier. It's more uniform flesh thickness cooks well in microwave ovens. The plant is more compact than traditional butternuts so it can be grown in small gardens. Butter Bowl resists bacterial spot, black fruit rot and vine borers. It should be available from Burpee Seed Co. in spring 2000.
- ❖ Cattle grazing brome pastures interseeded with legumes gain weight faster than those grazing pure brome fertilized with nitrogen, IANR forage research shows. Interseeding legumes such as alfalfa, birdsfoot trefoil or kura clover into brome also could eliminate the cost of annual brome pasture fertilization. Preliminary results showed that yearling calves grazing legume-fortified brome pastures gained up to a half-pound a day more than those grazing straight brome. Forage scientists are studying how best to establish, graze and manage pastures interseeded with legumes to help producers improve cattle performance and reduce production costs.
- ❖ A quick, accurate test IANR food scientists developed is

helping the food industry protect people with egg allergies. Food processors can use the simple test to detect even minute traces of egg residue in other foods processed on the same equipment.

The egg test was the second IANR food allergen test commercialized in 1998. The first was for peanuts. A Michigan company markets the tests to the food industry under a university licensing agreement. Tests for other food allergens to help protect allergic consumers are in the works.

- ❖ A recent NU flower release is designed to add a splash of color to large roadside or meadow plantings. An IANR horticulturist at NU's West Central Research and Extension Center developed Prairie Palette, a selection of *Penstemon grandiflorus*, the native shell-leaf penstemon. Prairie Palette is a mix of seeds selected for a wide range of colors from white, pink and lavender to deep purple when it blooms from May into June. Seed is available from Stock Seed Farms at Murdock.
- ❖ A landmark University of Nebraska agricultural research bulletin is back in print. "The Structure and Reproduction of Corn" by Theodore A. Kiesselbach, longtime NU College of Agriculture agronomist and geneticist, was published in 1949 by the Nebraska Agricultural Experiment Station. It became a seminal reference for plant scientists worldwide but had been out of print in recent years. New York's Cold Spring Harbor Laboratory Press re-issued the book in 1999. Kiesselbach was an agronomy professor from 1912 to 1952.

# Faculty Awards and Recognitions

**T**he 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

**Joe Atwood** received the Outstanding Published Research Award for "Examining Quantity and Quality Effects of Restricting Nitrogen Applications to Feed-grains" from the Western Agricultural Economics Association.

**Glenn Helmers** received the Outstanding Published Research Award for "Examining Quantity and Quality Effects of Restricting Nitrogen Applications to Feed-grains" from the Western Agricultural Economics Association.

**Richard K. Perrin** received the Journal of Agriculture and Resource Economics Published Research Honorable Mention Award for "The Impact of Technological Change on a Competitive Industry" from the Journal of Agriculture and Resource Economics.

## Agronomy

**Robert Graybosch** received the Fellow Award from the Crop Science Society of America.

**Stephen C. Mason** received the Fellow Award from the American Society of Agronomy and the Scientific Liaison Officer award from CIAT.

**Martin A. Massengale** was appointed by the Secretary of Agriculture to the USDA National Advisory Board on Research, Extension, Education, and Economics.

**Jim Schepers** received the 1998 IANR Team Effort Award for the MSEA Water Quality Project from the Institute of Agriculture and Natural Resources.

## Animal Science

**Elton Aberle** received the Fellow Award from the American Society of Animal Science and the Appreciation Award for Service and Dedication to Nebraska's Pork Industry from the Nebraska Pork Producers Association.

**Keith Gregory** received the Award of Merit from the University of Nebraska-Lincoln Chapter of Gamma Sigma Delta.

**Rodger Johnson** received the Distinguished Service Award from the National Swine Improvement Federation.

**James Kinder** received the Animal Physiology and Endocrinology Award from the American Society of Animal Science and the Award of Merit from the University of Nebraska-Lincoln Chapter, Gamma Sigma Delta.

**Daniel Pomp** received the Young Researcher Award from the Midwest Section of the American Society of Animal Science.

## Biochemistry

**Ruma V. Banerjee** was selected to serve as the Editor for Chemistry and Biochemistry of B<sub>12</sub> for John Wiley and Sons.

**Raymond Chollet** received the W.W. Marshall Family Distinguished Professor in Biotechnology from the University of Nebraska and was elected as a Fellow in the American Association for the Advancement of Science from AAAS, Section G (Biological Sciences).

**Carolyn Price** received the NIH Senior Fellowship from the National Institutes of Health and the Career Advancement Award from the National Science Foundation.

## Biological Systems Engineering

**Mohamed Dahab** received the Arthur Sidney Bedell Award from the Water Environment Federation.

**Dean Eisenhauer** received the 1998 IANR Team Effort Award for the MSEA Water Quality Project from the Institute of Agriculture and Natural Resources.

**Tom Franti** received the Junior Faculty Excellence in Research Award from the Agricultural Research Division.

**John Gilley** received the Best Research Paper Award from the Soil and Water Conservation Society.

**Rick Koelsch** received the Engineer of the Year Award from the Nebraska Section of American Society of Agricultural Engineering.



*Biological Systems Engineer Thomas Franti (left) received a 1998 Junior Faculty Excellence in Research Award from ARD Dean and Director Darrell Nelson.*



ARD Dean and Director Darrell Nelson (right) presented a 1998 Junior Faculty in Excellence Award to Nutrition Scientist Timothy Carr.

**Darrell Watts** received the 1998 IANR Team Effort Award for the MSEA Water Quality Project from the Institute of Agriculture and Natural Resources.

**Wayne Woldt** received the Team Research Award from the College of Engineering and Technology.

## Entomology

**Frederick P. Baxendale** received the Award in Urban Entomology from the Entomological Society of America.

**John E. Foster** received the Outstanding Scientist Award from the Nebraska Chapter, Sigma Xi and the Crops and Soils Award of Merit from the Indiana Crop Improvement Association.

**Leon G. Higley** received the 1998 Excellence in Graduate Education Award from the University of Nebraska Alumni Association.

**Shripat T. Kamble** received the Award of Merit from the North Central Branch, Entomological Society of America.

**Robert K.D. Peterson** received the Award for Corn IPM: Interactive Guide to Corn Insect Pest Management from the Board of Certified Entomologists.

**Steven R. Skoda** received the Certificate of Merit from the United States Department of Agriculture.

## Food Science and Technology

**Lloyd B. Bullerman** received the Fellow Award from the International Association of Milk, Food and Environmental Sanitarians, Inc.

## Horticulture

**Dermot P. Coyne** received an award and certificate of honorary membership in the Association of Agriculture Producers, Dominican Republic from the Association of Agriculture Producers, Dominican Republic and the certificate in honor of invited address at the Annual Meeting of the International Society for Tropical Horticulture held in Venezuela.

## Plant Pathology

**James R. Steadman** was recognized for fifteen years of contributions and collaboration with the Ministry of Agriculture Award from the Agricultural Producers Association of the San Juan Valley, Dominican Republic.

**Anne. K. Vidaver** received the Distinguished Service Award from the American Phytopathological Society.

## School of Natural Resource Sciences

**Hugh H. Genoways** received the Big 12 University Faculty Fellowship from the Office of the Senior Vice Chancellor for Academic Affairs, University of Nebraska-Lincoln.

**Shripat T. Kamble** was elected as national Director of the Board Certified Entomologists, the Chair of the Examining Committee-Board Certified Entomologists and was a Conference Chair for the Entomological Society of America.

**Roy F. Spalding** received the 1998 IANR Team Effort Award for the MSEA Water Quality Project from the Institute of Agriculture and Natural Resources.

## Family and Consumer Sciences

**Sheran Cramer** received the Martha Killian Diamond Professorship Award from the University of Nebraska-Omaha Alumni Association.

## Nutritional Science and Dietetics

**Timothy P. Carr** received the Junior Faculty Excellence in Research Award from the Agricultural Research Division.

## Panhandle Research and Extension Center

**David D. Baltensperger** received the Fellow Award from the Crop Science Society of America.

## West Central Research and Extension Center

**John B. Campbell** received the Award of Excellence in Integrated Pest Management from the North Central Branch, Entomological Society of America and was inducted into the Nebraska Hall of Agricultural Achievement.



# Graduate Student Awards and Recognitions

**O**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 650 graduate students are pursuing advanced degrees with ARD faculty. The quality of our graduate students is reflected in the recognition they receive.

## Agronomy

**Mine Aslan** received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

**Muhammad Akhtar** received the Henry M. Beachell Academic Support Fund Fellowship Award from the Department of Agronomy.

**Bekelea Abeyo Geleta** received the Henry M. Beachell Academic Support Fund Fellowship Award from the Department of Agronomy.

**Jasbir Singh** received the Henry M. Beachell Academic Support Fund Fellowship from the Department of Agronomy.

**Martin Williams II** received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

## Animal Science

**Dana Allen** received the Arthaud Travel Award from the Department of Animal Science to attend the American Dairy Science Association Annual Meeting.

**Jennifer Elston** received the Graduate Student Paper Presentation Award from the Poultry Science Association.

**Galen Erickson** received the Research Fellowship from the Purina Mills and the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

**Hector Jimenez-Severiano** received the Travel Grant to the International Symposium on Reproduction in Domestic Animals from the International Affairs Office.

**Douglas J. Jordon** received the Arthaud Travel Award from the Department of Animal Science to attend the American Society of Animal Science Annual Meeting.

**Curtis Novak** received the Research Fellowship Alternate from the Purina Mills and the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

**Tim Schnell** received a Travel Grant to the Reciprocal Meat Conference from the Nebraska Chapter of Sigma Xi, the Arthaud Travel Award to Reciprocal Meat Conference from the Department of Animal Science and was the 3<sup>rd</sup> Place Winner of Phi Tau Sigma Graduate Research Paper Competition at the Institute of Food Technologists Annual Meeting.

**Rebecca Splan** received the John Hallman Award from the Department of Animal Science.

**Ryoichi Teruyama** received the Graduate Student Paper Presentation Award from the Poultry Science Association.

**Vincente Vega Murillo** received a Travel Grant from the Nebraska Chapter of Sigma Xi to attend the American Society of Animal Science Annual Meeting.

## Biochemistry

**Saurabh Menon** received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

## Entomology

**Nor Aliza Abdul Rahim** received the Outstanding Poster Presentation, 1998 Ethnic Minority Graduate Research Symposium from the Dean of Graduate Studies, University of Nebraska-Lincoln.

**James Austin** received a scholarship from the National Conference on Urban Entomology, a Travel Grant from the Nebraska Chapter, Sigma Xi, the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee, Department of Entomology and the Jeffrey P. LaFage Graduate Student Research Award in Urban Entomology from the Entomological Society of America.

**Subrahmanyan Darbha** received the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee, Department of Entomology.

**Fikru Haile** received the Entomology Graduate Student Training Program Grant from the joint program between the Department of Entomology and Dow AgroSciences, the Hardin Distinguished Graduate Fellowship from the Agricultural Research Division, and the first place award in the poster presentation competition from the Entomological Society of America.

**Tiffany Heng-Moss** received the Outstanding Master's Thesis Award from the Dean of Graduate Studies, University of Nebraska-Lincoln and the Graduate Studies Fellowship from the Dean of Graduate Studies, University of Nebraska-Lincoln.

**W. Wyatt Hoback** received the Bukey Fellowship from the Office of Graduate Studies, the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division, the Warren F. and Edith R. Day Student Aid Fund Scholarship from the Dean of Graduate Studies, University of Nebraska-Lincoln, the second place award for poster presentation from the Entomological Society of America and the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee, Department of Entomology.

**Pari Pachamuthu** received the first place in Ph.D. oral presentation competition from the North Central Branch Entomological Society of America and the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee, Department of Entomology.

**Srinivas Parimi** received first place in the student poster competition from the Central States (Kansas) Entomological Society and the second place award for poster presentation from the Entomological Society of America.

**No-Joong Park** received the Ward A. and Helen W. Combs Scholarship from the Presto-X-Company, the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee, Department of Entomology, the Travel Grant from the Nebraska Chapter, Sigma Xi and first place in Ph.D research poster presentation competition from the North Central Branch Entomological Society of America.

**Rico Rana** received the Graduate Studies Fellowship Award from the Dean of Graduate Studies, University of Nebraska-Lincoln and the Myron H. Swenk Fund Travel Award (twice) from the Bruner Club Executive Committee, Department of Entomology.

**Connie Reimers** received the Mary and Charles C. Cooper/Emma I. Sharpless Scholarship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division and the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee, Department of Entomology.

**Lilian Saldanha** received the Travel Grant Award from the Nebraska Chapter, Sigma Xi.

**Andrew B. Smith** received the second place award for oral presentation from the Entomological Society of America.

**Jenny Stebbing** received the Mary and Charles C. Cooper/Emma I. Sharpless Scholarship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division.

**John Thomas** received the Travel Grant Award from the Nebraska Chapter, Sigma Xi and second place in student poster competition from the Central States (Kansas) Entomological Society.

**Mario Urias-Lopez** received the Myron H. Swenk Fund Travel Award from the Bruner Club Executive Committee, Department of Entomology.

## Food Science and Technology

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

**Mehmet Sevket Cetin** received a Travel Award from the American Society for Microbiology.

**Jaehyoung Kim** received a Travel Award from the American Society for Microbiology.

## Horticulture

**Kevin W. Frank** received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

**Neil L. Heckman** 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.

## Plant Pathology

**Bryan Adams** received the Milton E. Mohr Fellowship Award from the Center for Biotechnology.

**Mee-Sook Kim** received the Luis Sequeira Student Travel Award from the American Phytopathological Society and the Graduate Student Research Fellowship from the Nebraska Statewide Arboretum.

**Liangwu Sun** received the Milton E. Mohr Fellowship Award from the Center for Biotechnology.

**Zhongge Zhang** received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

## School of Natural Resource Sciences

**James W. Austin** received the Jeffrey P. LaFage Graduate Student Research Award Scholarship and National Certificate from The Entomological Society of America.

**Tadd M. Barrow** received a Travel Grant from the Wildwood Trust Fund, University of Nebraska-Lincoln.

**No-Joong Park** received the Ward A. and Helen W. Combs Scholarship from the Presto-X Company.

**Qingwu Xue** received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

## Veterinary and Biomedical Sciences

**Cynthia Warnes** received the Milton E. Mohr Scholarship from the UNL Biotechnology Center and the Bill and Muriel Wilkins Award from the College of Engineering and Technology.

**Aruna Ambagala** received the Milton E. Mohr Fellowship from the UNL Biotechnology Center.

**Zhengyu Feng** received the Milton E. Mohr Fellowship from the UNL Biotechnology Center.

**Chris Topliff** received the Widaman Trust Distinguished Fellowship Graduate Assistant Award from the Agricultural Research Division.

## Family and Consumer Sciences

**Fuming Xing** received the Presidential Fellowship from the Presidents Office/University of Nebraska.

# Undergraduate Honors Student Research Program

**T**he 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. The results of the research are often presented at scientific meetings.

## Agricultural Economics

**Ryan Fuchs** received an Honors Award for "Transfer Methods for Water Rights to Achieve Natural Resource Policy Goals" from the Agricultural Research Division. (R.J. Supalla, Advisor)

## Animal Science

**Chris Cederberg** received an Honors Award for "Differential Leptin Binding to Uncoupling Protein and Corresponding Effects on Fat Regulation" from the Agricultural Research Division. (J.L. Minor, Advisor)

**Nicole John** received an Honors Award for "Horse Coat Color Genetics" from the Agricultural Research Division. (L.D. Van Vleck, Advisor)

**Aaron Hemmer** received first place (tie) in the Undergraduate Research Symposium from the Howard Hughes Medical Institute and the Department of Animal Science. (J.L. Minor, Advisor)

**Jessica Koss** received an Honors Award for "Evaluation of Milk Production and Energy Utilization in Lactating Mice Divergently Selected for Heat Loss" from the Agricultural Research Division. (M.K. Nielsen, Advisor)

**Jennifer Strickland** received the Undergraduate Research Paper Competition Award from the Midwest Section of the American Society of Animal Science (an undergraduate honors award recipient 1997-98). (J.L. Minor, Advisor)

## Biological Systems Engineering

**Nicholas L. Burns** received an Honors Award for "Dual Removal of Perchlorate and Nitrates from Ground Water Through Biological Reduction" from the Agricultural Research Division. (D.D. Schulte, Advisor)

## Biochemistry

**Heather M. Root** received an Honors Award for "Utilizing Two Hybrid Analysis to Characterize Telomere Protein Interactions" from the Agricultural Research Division. (C. Price, Advisor)

## School of Natural Resource Sciences

**Stacy Mortensen** received an Honors Award for "Best Method to Prevent the Germination of Commercial Bird Seed Underneath Bird Feeders" from the Agricultural Research Division. (R.J. Johnson, Advisor)

## Veterinary and Biological Sciences

**Joel N. Kniep** received an Honors Award for "Role of Entry Genes in Virulence of Legionella" from the Agricultural Research Division. (J. Cirillo, Advisor)

## Nutritional Science and Dietetics

**Salena Revelle** received an Honors Award for "Analysis of the Effectiveness of the Nutrition Education Project (NEP) on Limited Resource Families in Nebraska from 1994 to 1999" from the Agricultural Research Division. (M. Schnepf, Advisor)

# Variety and Germplasm Releases

**A**RD 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 1998.

## Agronomy

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

*Germplasm*

*Release:* N244 and N245

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

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

*Characteristics:* N244 and N245 germplasm lines are R-lines with high yield potential in hybrid combinations. N244 reached anthesis in 86 days, averaged 115 cm in height in Lincoln, NE in 1995, has purple plant color, white pericarp, and no pigmented testa. N245 reached anthesis in 72 days, averaged 95 cm in height, has tan plant color, white pericarp, and no pigmented testa. Reactions of these germplasm lines to specific insects or diseases have not been determined. These germplasms are a source of genetic diversity and heterosis potential. They have immediate application for use as a source of

these characters in applied breeding programs, and may also have potential application as pollen parents for hybrid production.

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

*Germplasm*

*Release:* N246 and N247

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

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

*Characteristics:* N246 and N247 germplasm lines are very early R-lines (59 and 58 days to anthesis), with tan plant color, white pericarp, no pigmented testa, and are 75 and 115 cm in height at maturity. Sterility reaction of N246 and N247 was determined in the greenhouse. All other data were collected in the field at Lincoln, NE in 1997. Reactions of these germplasm lines to specific insects or diseases have not been determined. These germplasms are a source of very early maturity packaged in tan plant color, white pericarp lines. They have application as parents in applied breeding programs targeting early maturity, and may also have potential application as pollen parents for early hybrid production.

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

*Germplasm*

*Release:* N248R and N249R

*Scientists:* D.J. Andrews, J.F. Rajewski, D.D. Baltensperger, and P.T. Nordquist

*Characteristics:* N248R and N249R are very early maturing white grained sorghum inbreds that restore male fertility on A<sub>1</sub> cms (milo cytoplasm). Both lines are dwarf. N248R is a normal (purple) plant color with large white seeds for its maturity class. N249R has tan plant, tan glume plant color with large pale yellow endosperm seeds with translucent pericarp. Pest and disease reactions of these lines have not been determined. N248R and N249R because of their earliness, white large grain type, performance in hybrids, and parentage provide new genetic diversity in male parents for white seeded hybrids. N249R, if used in combination with white grain tan plant seed parents, will produce food quality hybrids.

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

**Germplasm Release:** N250A, N251A, and N252A and their respective maintainer B lines

**Scientists:** D.J. Andrews, J.F. Rajewski, D.D. Baltensperger, and P.T. Nordquist

**Characteristics:** N250A and B were developed by pedigree selection from an early maturing progeny, No. 1207, from University of Nebraska Ross's population NP2/6B. Hybrids in trials at various locations from 1994 to 1997 have performed competitively with yields from 1100 to 8180 kg/ha. N250B is a dwarf, averaging 83 cm, tan plant with medium-sized hard white grain. It flowers 3 to 5 days later than N123B, a standard for the very early maturing class in the Panhandle.

N251A and B were obtained by pedigree selection from a 1984 cross between an early maturing red seeded A<sub>1</sub> maintainer line H1160 from the ICRISAT CIMMYT cool tolerant random-mating population and a late maturing tan plant tropically adapted B line from ICRISAT called MB5. Hybrids have been tested at several locations in the Panhandle since 1995 which have been competitive with checks, yielding between 2340 and 6800 kg/ha. N251B is a dwarf, about 87 cm, normal color (purple) plant with medium-sized hard pale red seed, a long peduncle, and flowering 2 to 8 days later than N123B.

N252A and B resulted from a cross between an early maturing red seeded A<sub>1</sub> maintainer line H1160 and a tropically adapted tan plant late maturing line Diallel 346-8 from ICRISAT, India. Hybrids tested in several locations in western Nebraska and South Dakota have been competitive with checks giving yields between 1160 and 6220 kg/ha. N252B is a dwarf, about 84 cm, tan glume tan plant with medium-small, 25g/1000m hard pale cream seed with a translucent pericarp, and flowering 2 to 9 days later than N123B. Pest and disease reactions of these lines have not been determined.

All three seed parents, because of their earliness, parentage and hybrid performance, provide new genetic diversity for producing early maturing hybrids. N250A and N252A, if used in conjunction with tan plant white grain restorers, will produce early food quality hybrids.

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

**Germplasm Release:** 26 Seed Parents (A-Lines) N253-N278 and their respective maintainers (B-lines)

**Scientists:** D.J. Andrews, J.F. Rajewski, and A.J. Heng.

**Characteristics:** All seed parents, except N253, N254, and N278 were developed from the program to introgress tropically adapted food quality sorghum germplasm into existing Midwest sorghum seed parents. All A lines have consistently shown good male sterility over the years. In general, these seed parents are average to short in height and medium early to medium late in maturity. All but 4 have white or pale yellow grain and 16 have tan plant color. Pest and disease reactions of these lines have not been determined. Because of their parentage and ability to make good hybrids, these seed parents offer new genetic diversity for the development of new hybrids.

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

**Germplasm Release:** 33 Seed Parents (A-Lines) N279-N311 and their respective maintainers (B-lines)

**Scientists:** D.J. Andrews, J.F. Rajewski, and A.J. Heng.

**Characteristics:** All seed parent germplasms were developed from the program to introgress tropically adapted food quality sorghum into existing U.S. sorghum seed parents. All A lines have consistently shown good male sterility over years. In general, these seed parents are average to short in height and medium early to medium late in maturity. All but one have white or pale yellow grain and 23 have tan plant color. Pest and disease reactions of these germplasms have not been determined. Because of their parentage and ability to make good hybrids, these seed parents offer new genetic diversity for the development of new hybrids.

**Crop:** Grain Pearl Millet [*Pennisetum glaucum* (L.) R.Br.]

**Germplasm Release:** NM-1A<sub>1</sub>/NM-1A<sub>4</sub>/NM-1B and NM-2A<sub>1</sub>/NM-2A<sub>1</sub>/NM-2B

**Scientists:** D.J. Andrews, J.F. Rajewski, L.A. Pavlish

**Characteristics:** NM-1B is an early dwarf, synchronous tillering inbred that averages between 76-95 cm in height at maturity and flowers between 56 and 64 d after early to mid-June plantings. It has

ovate-shaped, dull gray seeds and yellow anthers. NM-2B is an early dwarf, synchronous tillering inbred that averages between 66-78 cm in height at maturity and flowers between 58 and 65 d after early to mid-June plantings. It has ovate-shaped, bright gray seeds and has yellow anthers. Pest and disease reactions of these lines have not been determined. Yield performance tests from 1994-1997 in a limited number of hybrid combinations indicate NM-1B and NM-2B have good combining ability for grain yield to produce earlier maturing dwarf grain pearl millet hybrids for the Midwestern U.S.

- Crop:* Grain Pearl Millet [*Pennisetum glaucum* (L.) R.Br.]
- Germplasm Release:* NM-3A<sub>1</sub>/NM-3A<sub>4</sub>, NM-3B, NM-4A<sub>1</sub>/NM-4A<sub>4</sub>/NM-4B, and NM-5A<sub>1</sub>/NM-5A<sub>4</sub>/NM-5B
- Scientists:* D.J. Andrews, J.F. Rajewski, and L.A. Pavlish
- Characteristics:* NM-3B is a medium maturity, leafy, dwarf, synchronous tillering, inbred with semi-erect leaves that averages between 82-108 cm in height at maturity and flowers between 69 and 76 d after early to mid-June plantings. NM-3B has ovate-shaped, gray seeds and yellow anthers. Grain hybrids with NM-3B have a tendency to root lodge in heavy clay soils in the fall after heavy rainfall and wind. NM-4B is a medium maturity, dwarf, synchronous tillering inbred that averages between 66-80 cm in height at maturity. It flowers in between 68 and 75 d after early to mid-June plantings and has a very stiff stalk. NM-4B has ovate-shaped, gray seeds and has yellow anthers. NM-5B is a medium maturity dwarf, leafy, synchronous tillering inbred with semi-erect leaves that averages between 72-88 cm in height at maturity. It flowers between 69 and 78 d after early to mid-June plantings and has a very stiff stalk. NM-5B has ovate-shaped, gray seeds and has purple anthers. Pest and disease reactions of these lines have not been determined. The main advantages of these lines are their medium maturity, shorter stature and larger seed size which provide significant improvement over 23D<sub>1</sub>BE<sub>1</sub> as seed parents for use in an eastern Nebraska grain hybrid production situation.

- Crop:* Grain Pearl Millet [*Pennisetum glaucum* (L.) R.Br.]
- Germplasm Release:* NM-6R<sub>1</sub>
- Scientists:* D.J. Andrews, J.F. Rajewski, and J.D. Eastin
- Characteristics:* NM-6R<sub>1</sub> is a medium early, dwarf, near synchronous tillering inbred that averages between 78-92 cm in height at maturity and flowers between 57 and 63 d after early to mid-June plantings. NM-6R<sub>1</sub> has yellow anthers, sheds pollen profusely, and has elongate-shaped, light gray seeds. It has thin compact pencil-shaped panicles and panicle exertion of 10-15 cm with a stiff peduncle and stalk. NM-6R<sub>1</sub> produces 1-2 tillers per plant which are upright in habit at high and low planting densities. Pest and disease reactions of these lines have not been determined. Yield performance tests in a limited number of hybrid combinations indicate NM-6R<sub>1</sub> has good combining ability for grain yield with several early and medium maturity seed parents over a wide range of environments. Lodging evaluation indicates the stiff stalk trait reduces lodging in the Midwestern environments and could be useful in future hybrid combinations.

- Crop:* Grain Pearl Millet [*Pennisetum glaucum* (L.) R.Br.]
- Germplasm Release:* NM-7R<sub>1</sub>
- Scientists:* D.J. Andrews, J.F. Rajewski, and J.D. Eastin
- Characteristics:* NM-7R<sub>1</sub> is a medium late, dwarf, synchronous tillering inbred that averages between 72-98 cm in height at maturity and flowers between 72 and 79 d after early to mid-June plantings. NM-7R<sub>1</sub> has yellow anthers, sheds pollen profusely, and has ovate-shaped, light gray seeds. It has compact candle-shaped panicles and panicle exertion of 2-3 cm with a very stiff peduncle and stalk. NM-7R<sub>1</sub> has semi-erect leaves and produces 2-3 tillers per plant which are upright in habit at high and low planting densities. Pest and disease reactions of this line have not been determined. Yield performance tests in a limited number of hybrid combinations indicate NM-7R<sub>1</sub> has good combining ability for grain yield with several medium maturity seed parents. Lodging evaluation indicates the stiff stalk trait reduces lodging in the Midwestern environments and could be very useful in future hybrid combinations with selected stiff stalk seed parents.

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

**Variety:** 'NE3399'

**Scientists:** G.L. Graef, L.L. Korte, and D.W. White

**Characteristics:** NE3399 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 black hilum. NE3399 matured 1.3 d later than 'Iroquois', with 2.7 bu/a higher yield, similar plant height, similar seed weight, and similar protein and oil content. In Nebraska tests during 1996-97, NE3399 yielded 66.1 bu/a, compared with 62.4 for Iroquois. NE3399 matured 3 d later than Iroquois, with similar lodging score, seed quality, seed size, and composition. NE3399 is susceptible to brown stem rot and phytophthora rot.

## Horticulture

**Crop:** Dry Edible Bean (*Phaseolus vulgaris* L.)

**Variety:** 'Weihing'

**Scientists:** D.P. Coyne, D.S. Nuland, D.T. Lindgren, J.R. Steadman, D.W. Smith, J. Gonzales, J. Schild, J.M. Reiser, L.A. Sutton, C. Carlson, J.R. Stavely, and P. Miklas

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

**Characteristics:** Great Northern 'Weihing', possessing multiple disease resistance, was derived from cyclical intercrosses of advanced lines derived from crosses of adapted and exotic dry edible bean parents possessing desired traits. Pedigree selection was used to develop near homozygous lines for the intercrossing cycles. Weihing has resistance to the prevailing rust pathotypes in Nebraska and Colorado (UR3 and UR6 genes), halo blight, common bacterial blight, and bean common mosaic virus (I gene). Weihing expresses a moderate avoidance to the white mold disease due to its porous plant architecture. Its upright plant habit is classified as Type IIb. Weihing is moderately early in maturity (90-95 days), with a seed size ranging from 29 to 40g per 100<sup>-1</sup> seed.

**Crop:** Dry Edible Bean (*Phaseolus vulgaris* L.)

**Germplasm Release:** Great Northern BELMINEB-RMR-4 and 5 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 Agricultural Research Service, Michigan State University Agricultural Experiment Station, and University of Nebraska Agricultural Research Division

**Characteristics:** The pedigree of both rust and bean common mosaic virus resistant Great Northern lines is G9459\* 2/4/G91213\* 2/3/STARLIGHT\* 2//ALPINE\* 3/BELMIDAK-RR-2. These are the first Great Northern lines to combine 3 major genes (UR-11, UR-6, and UR-4) with resistance to 89 rust races and two genes (I, bc-1<sup>2</sup>) for resistance to all strains of bean common mosaic and prevalent strains of bean common mosaic necrosis viruses, along with moderately early maturity, and upright, short vine plant habit (type II). Homozygosity for the UR-4, UR-11, bc-1<sup>2</sup> and I genes was identified in the F<sub>4</sub> of the final cross with G94567 in both lines, and for BELMINEB-RMR-5 in the F<sub>5</sub>. BELMINEB-RMR-4 consisted of bulked F<sub>6</sub> from F<sub>5</sub> plants. BELMINEB-RMR-5 consisted of bulked F<sub>7</sub> from all of F<sub>6</sub> plants that were homozygous for UR-6, derived from a single F<sub>4</sub> plant. The seed size of BELMINEB-RMR-4 ranged from 33 to 38 g per 100<sup>-1</sup> seed, while the seed size of BELMINEB-RMR-5 ranged from 37 to 38 g per 100<sup>-1</sup> seed.

# Copyrights and Patents

**C**opyright and patent protection is an important parameter in research. It is especially important for discoveries and innovations which 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 1998.

## Animal Science

**Patent Title:** Ruminant feed and method for making  
**Patent Number:** 5,789,001  
**Scientists:** T.J. Klopfenstein, T.S. Winowski, R.A. Britton, and N. Barney.  
**Description:** This patent covers the treatment of oilseeds to protect the oil in the seed from rumen hydrogenation. We previously patented the process of treating proteins with sugar and heat to protect the protein from rumen degradation. That technology is now being used in the current patent to protect the oil in the seed as well as the protein. The protected oil can be used to modify the type of fat in animal products such as body fat in cattle or milk fat. The most probable use would be in production of "designer" dairy products.

## Biochemistry

**Patent Title:** Oxidase-producing aspergillus niger  
**Patent Number:** 5,866,406  
**Scientists:** F.W. Wagner and J.P. Markwell  
**Description:** Gluconate is produced by the commercial fermentation of glucose by the fungus, *Aspergillus niger*. A byproduct from the fermentation is the enzyme glucose oxidase. Glucose oxidase is sold commercially for such purposes as the measurement of glucose in biological fluids and the desugaring of egg whites prior to drying. At present, the production of glucose oxidase is coupled to the production of gluconate, but companies carrying out this process could market more of the glucose oxidase enzyme. Production of more glucose oxidase necessitates the simultaneous production of gluconate, for which there may not be a market. This patent describes how to produce strains of *Aspergillus niger* which are constitutive for the glucose oxidase enzyme and increase production of this component without concomitant production of more gluconate.

## Food Science and Technology

**Patent Title:** Silicalite membrane and method for the selective recovery and concentration of acetone and butanol from model ABE solutions and fermentation broths  
**Patent Number:** 5,755,967  
**Scientists:** M.M. Meagher, N. Qureshi, and R.W. Hutkins  
**Description:** Process patent to recovery butanol, acetone and ethanol from fermentation broth using pervaporation, a membrane separation technique that selectively removes organics from water. The butanol, acetone and ethanol are produced during the fermentation of corn. The method is more energy efficient than traditional distillation.



**A**RD 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 1999)

### University of Nebraska Board of Regents

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

### Student Regents

UNMC - Steve Volin  
UNO - Jon Shrodar  
UNL - Andrew Schuerman  
UNK - Holley Hatt

### 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

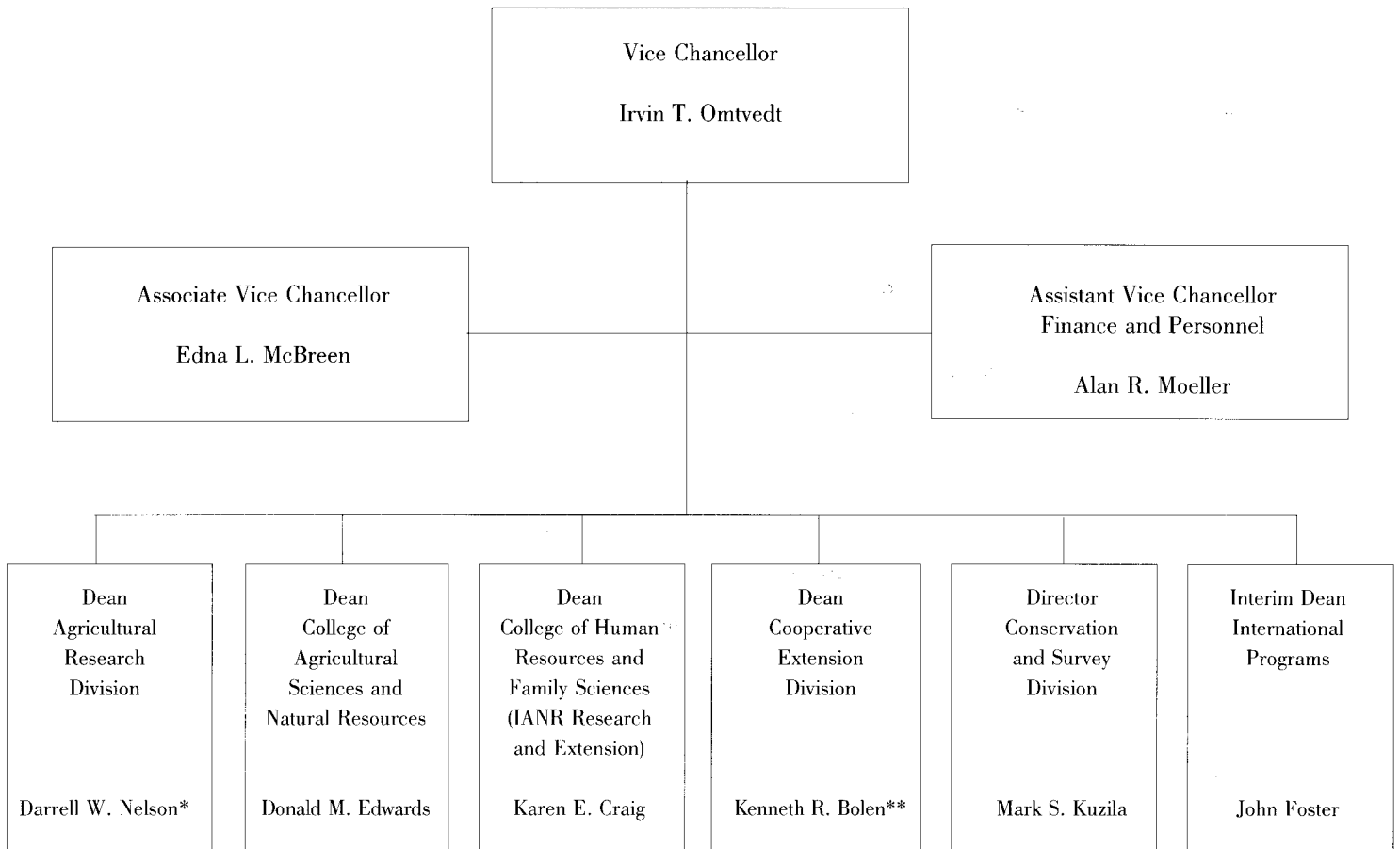
Darrell W. Nelson, Dean and Director  
Dale H. Vanderholm, Associate Dean and Director  
Karen E. Craig, Assistant Director/Human Resources  
and Family Sciences  
Steven S. Waller, Assistant Dean and Director  
Nancy Lewis<sup>1</sup>, Administrative Intern  
Dora Dill, Administrative Technician  
Nelve Lienemann, Staff Assistant  
Diane Mohrhoff, Project Assistant  
Shirley McCain<sup>1</sup>, Temporary/On Call

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<sup>1</sup>Temporary appointment

# Organizational Chart

## Institute of Agriculture and Natural Resources University of Nebraska-Lincoln June 1998



\*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 1999**

**Agricultural/Natural Resources Units**

*Agricultural Economics*

Gary Lynne, Head<sup>1</sup>  
Jeffrey Royer, Interim Head<sup>2</sup>

*Agricultural Leadership, Education and Communication*

Earl Russell, Head

*Agronomy*

Kenneth Cassman, Head

*Animal Science*

Roger Mandigo, Interim Head<sup>1</sup>  
Donald Beermann, Head<sup>2</sup>

*Biochemistry*

Robert Klucas, Head

*Biological Systems Engineering*

Glenn Hoffman, Head

*Biometry*

Anne Parkhurst, Head<sup>1</sup>  
David Marx, Chair<sup>2</sup>

*Entomology*

Sharron Quisenberry, Head<sup>1</sup>  
Z B Mayo, Interim Head<sup>2</sup>

*Food Science and Technology*

Steve Taylor, Head

*Horticulture*

David Lewis, Head

*Plant Pathology*

Anne Vidaver, Head

*School of Natural Resource Sciences*

Blaine Blad, Director

*Veterinary and Biomedical Sciences*

Jack Schmitz, Head

**Human Resources and Family Sciences Departments**

*Family and Consumer Sciences*

Shirley Baugher, Chair

*Nutritional Science and Dietetics*

Marilynn Schnepf, Chair

*Textiles, Clothing and Design*

Rita Kean, Chair

**Off-Campus Research Centers**

*Agricultural Research and Development Center*

Ithaca—Daniel Duncan, Director

*Northeast Research and Extension Center*

Concord — John Witkowski, Director

*Panhandle Research and Extension Center*

Scottsbluff — Charles Hibberd, Director

*South Central Research and Extension Center*

Clay Center — Alan Baquet, Director

*Southeast Research and Extension Center*

Lincoln — Randy Cantrell, Director

*West Central Research and Extension Center*

North Platte — Gary Hergert, Director

**Interdisciplinary Centers**

*Biotechnology Center*

Anne Vidaver, Director

*Food Processing Center*

Steve Taylor, Director

*Center for Grassland Studies*

Martin Massengale, Director

*Great Plains Regional Center for Global Environmental Change*

Shashi Verma, Director

*Industrial Agricultural Products Center*

Milford Hanna, Director

*Center for Rural Community Revitalization and Development*

Sam Cordes<sup>1</sup>, Director  
John Allen<sup>2</sup>, Director

*Center for Sustainable Agricultural Systems*

Chuck Francis, Director

*Water Center/*

*Environmental Programs*

Bob Volk<sup>1</sup>, Director  
Edward Vitzthum<sup>2</sup>, Interim Director

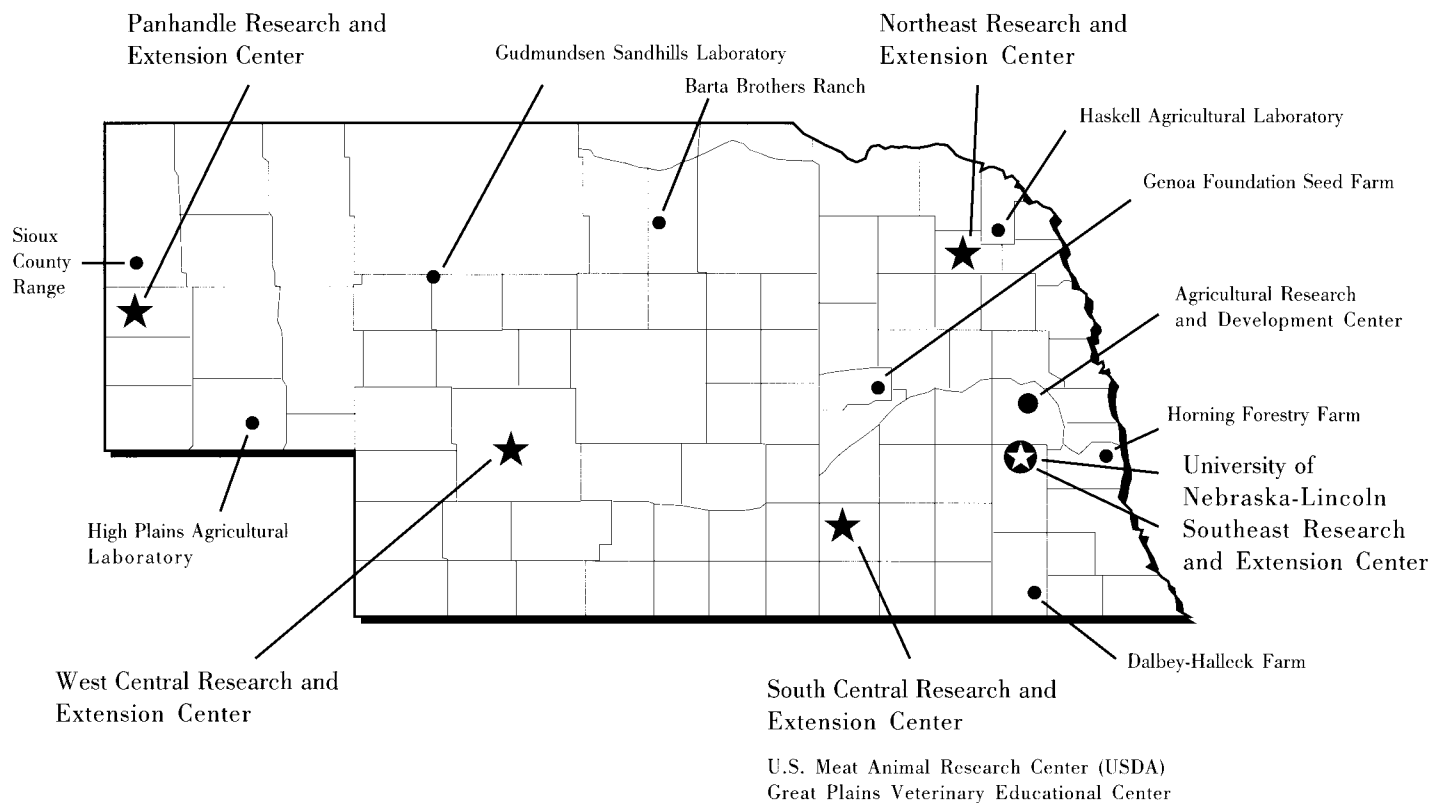
*IANR Communications and Information Technology*

Dan Cotton, Director

<sup>1</sup>Ended appointment during 1998-1999

<sup>2</sup>Began appointment during 1998-1999

## 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

## Faculty

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**A**pproximately 279 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.

The 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 percentages are based on the Fiscal Year 1998-99 Departmental Budget Listing.

## Agricultural/Natural Resources Units

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

## Agricultural Leadership, Education and Communication

Earl B. Russell	Professor	0.30	0.05	0.05	0.60	Head, Distance Education Policy
John E. Barburto, 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	0.15		Distance Education Policy

<sup>1</sup>Ended research appointment during 1998-1999

<sup>2</sup>Began research appointment during 1998-1999

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
<b>Agronomy</b>						
Kenneth G. Cassman	Professor	0.55	0.25	0.20		Head
Bruce E. Anderson	Professor	0.25	0.75			Forage Management
David J. Andrews <sup>1</sup>	Professor	0.87	0.13			Millet and Sorghum Breeding
Timothy J. Arkebauer	Associate Professor	0.85		0.15		Crop Environmental Physiology
P. Stephen Baenziger	Professor	0.75		0.25		Small Grains Breeding and Genetics
Robert M. Caldwell	Assistant Professor	0.40	0.60			Cropping Systems Specialist
Max Clegg	Associate Professor	0.75	0.25			Crop Physiology/K-12 Coordinator
John W. Doran	Professor				USDA	Soil Biochemistry
Rhae A. Drijber	Assistant Professor	0.60		0.40		Soil Microbiology Ecology
Jerry D. Eastin	Professor	0.85	0.15			Crop Physiology
Charles A. Francis	Professor	0.36	0.35	0.04	0.25	Crop Production/ Director of the Center for Sustainable Agricultural Systems
Kenneth D. Frank <sup>1</sup>	Associate Professor	0.25	0.25		0.50	Soil Fertility Specialist
Kulvinder Gill	Assistant Professor	0.80		0.20		Plant Molecular Cytogeneticist
George L. Graef	Associate Professor	0.85		0.15		Soybean Breeding and Genetics
Robert Graybosch	Associate Professor				USDA	Wheat Genetics
Donald J. Lee	Associate Professor	0.40		0.60		Plant Genetics
David T. Lewis	Professor	0.26	0.14	0.20		Soil Genesis and Classification
John Lindquist	Assistant Professor	0.80		0.20		Weed Ecophysiology
Jerry Maranville	Professor	0.85		0.15		Sorghum Physiology
John P. Markwell	Professor	0.10			0.90	Plant Biochemist
Alexander Martin	Professor	0.33	0.67			Weed Science, Extension Coordinator
Stephen C. Mason	Professor	0.50		0.50		Crop Production
Martin A. Massengale	Professor	0.37	0.19	0.19	0.25	Grassland Forages/Director of the Center for Grassland Studies
Robert A. Masters	Associate Professor				USDA	Range Weed Control
Dennis McCallister	Associate Professor	0.40		0.60		Soil Chemistry
David A. Mortensen	Associate Professor	0.75		0.25		Weed Science
Lowell E. Moser	Professor	0.35		0.65		Forage Physiology
Lenis A. Nelson	Professor	0.50		0.50		Crop Variety Evaluation/New Crops
Jeffrey Pedersen	Professor				USDA	Sorghum Genetics and Breeding
C. James Peterson <sup>1</sup>	Professor				USDA	Wheat Genetics
William L. Powers	Professor	0.88		0.12		Soil Physics
W. Ken Russell <sup>2</sup>	Assistant Professor	0.80		0.20		Plant Quantitative Genetics/Statistical Genomics
Walter H. Schacht	Associate Professor	0.60		0.40		Range Science
James S. Schepers	Professor				USDA	Soil Chemistry
John Shananan <sup>2</sup>	Assistant Professor				USDA	Crop Physiology
David R. Shelton	Associate Professor	0.80	0.20			Cereal Chemist
Joseph H. Skopp <sup>1</sup>	Associate Professor	0.50		0.50		Soil Physics
James E. Specht	Professor	0.80		0.20		Soybean Physiology and Breeding
Paul E. Staswick	Professor	0.85		0.15		Molecular Genetics
James Stubbendieck	Professor	0.25		0.25	0.50	Range Ecology/ Management/Director of the Center for Great Plains Studies
Gary E. Varvel	Associate Professor				USDA	Soil Management
Kenneth P. Vogel	Professor				USDA	Grass Breeding
Daniel T. Walters	Associate Professor	0.60		0.40		Soil Management
J. Troy Weeks	Assistant Professor				USDA	Sorghum Molecular Biology
Brian Wienhold	Assistant Professor				USDA	Soil Fertility
Wallace W. Wilhelm	Professor				USDA	Crop Physiology

<sup>1</sup>Ended research appointment during 1998-1999

<sup>2</sup>Began research appointment during 1998-1999

## Animal Science

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Donald H. Bermann <sup>2</sup>	Professor	0.35	0.34	0.31		Head
Mary M. Beck	Professor	0.70		0.30		Poultry Physiology
Gary L. Bennett	Professor				USDA	Systems
Michael D. Bishop <sup>1</sup>	Assistant Professor				Industry	Genetics
Dennis R. Brink	Professor	0.30		0.70		Ruminant Nutrition
Chris R. Calkins	Professor	0.70		0.30		Meats
Ronald K. Christenson	Professor				USDA	Physiology
Edgar T. Clemens	Professor	0.50		0.50		Gastroenteric Physiology
L. Davis Clements	Professor	0.18	0.07		0.75	Meat and Poultry By-products
Larry V. Cundiff	Professor				USDA	Beef Genetics
Michael J. D'Occhio	Professor				USDA	Physiology
Calvin L. Ferrell	Professor				USDA	Nutrition
J. Joe Ford	Professor				USDA	Physiology
Richard J. Grant	Associate Professor	0.70	0.30			Dairy Nutrition
Keith E. Gregory <sup>1</sup>	Professor				USDA	Beef Genetics
H. Edward Grotjan, Jr.	Professor	0.15		0.30		Physiology
Thomas G. Jenkins	Professor				USDA	Genetics
Rodger K. Johnson	Professor	0.60		0.40		Swine Genetics
Steven J. Jones	Associate Professor	0.35		0.65		Meats
Jeffrey F. Keown	Professor	0.30	0.70			Dairy Management
James E. Kinder	Professor	0.45		0.30	0.25	Beef Physiology
Roger J. Kittok	Associate Professor	0.85		0.15		Reproductive Physiology
Terry J. Klopfenstein	Professor	0.70		0.30		Ruminant Nutrition
Richard K. Koelsch	Assistant Professor	0.09	0.21		0.70	Livestock Waste Management
Mohammad Koohmaraie	Associate Professor				USDA	Meats
Larry L. Larson	Associate Professor	0.50		0.50		Dairy Physiology
Dan B. Laster	Professor				USDA	Reproductive Physiology
Donald G. Levis	Professor	0.25	0.75			Swine Management
Austin J. Lewis	Professor	0.70		0.30		Swine Nutrition
Kreg A. Leymaster	Professor				USDA	Genetics
Donald D. Lunstra	Professor				USDA	Physiology
Roger W. Mandigo	Professor	0.60		0.40		Meats
Phillip S. Miller	Associate Professor	0.60		0.40		Swine Nutrition
C. Todd Milton	Assistant Professor	0.50	0.40	0.10		Feedlot Nutrition
Jess L. Miner	Assistant Professor	0.70		0.30		Nutritional Biochemistry
Mark Morrison	Associate Professor	0.38		0.12	0.50	Rumen Microbiology
Daniel W. Moser <sup>1</sup>	Assistant Professor	0.35		0.65		Carcass Evaluation
Merlyn K. Nielsen	Professor	0.60		0.40		Genetics
J. Calvin Parrott, III	Professor				Industry	Ruminant Nutrition
Jerome C. Pekas	Associate Professor				USDA	Nutrition
Daniel H. Pomp	Associate Professor	0.75		0.25		Genetics
Rick J. Rasby	Associate Professor	0.25	0.75			Beef Management
Thomas A. Rathje <sup>2</sup>	Assistant Professor				Industry	Swine Genetics
Andrew J. Roberts	Assistant Professor				USDA	Physiology
Gary A. Rohrer	Assistant Professor				USDA	Genetics
Sheila E. Scheideler	Associate Professor	0.45	0.50	0.05		Poultry Management
L. Dale Van Vleck	Professor	0.05		0.15	USDA	Genetics
Vincent H. Varel	Associate Professor				USDA	Bacterial Physiology
Thomas H. Wise <sup>1</sup>	Assistant Professor				USDA	Physiology
Jong-Tseng Yen	Professor				USDA	Nutrition
Dwane R. Zimmerman	Professor	0.50		0.50		Swine Physiology



	<b>Rank</b>	<b>Rsch</b>	<b>Ext</b>	<b>Tch</b>	<b>Other</b>	<b>Area of Responsibility</b>
<b>Biochemistry</b>						
Robert V. Klucas	Professor	0.90		0.10		Head, Nitrogen Fixation
Lori A. Allison	Assistant Professor	0.80		0.20		Plant Molecular Genetics
Ruma V. Banerjee	Associate Professor	0.85		0.15		Mechanistic Enzymology
Raymond Chollet	Professor	0.80		0.20		Photosynthesis
Vadim N. Gladyshev	Assistant Professor	0.80		0.20		Protein Biochemistry, Selenium
Herman W. Knoche	Professor	0.40		0.40		Lipid Biochemistry
John P. Markwell	Professor	0.50		0.40	0.10	Plant Biochemistry
Carolyn Price	Associate Professor	0.25			0.75	Biochemistry
Stephen W. Ragsdale	Professor	0.85		0.15		Enzymes
Gautam Sarath	Associate Professor	1.00				Protein Biochemistry
Robert J. Spreitzer	Professor	0.85		0.15		Plant Molecular Genetics
Donald P. Weeks	Professor	0.55		0.10	0.35	Plant Molecular Biology
<b>Biological Systems Engineering</b>						
Glenn J. Hoffman	Professor	0.35	0.50	0.15		Head
Leonard L. Bashford	Professor	0.45		0.30	0.25	Tractors and Design Engineering
Rhonda M. Brand	Assistant Professor	0.50		0.50		Environmental Health Engineer
Tami Brown-Brandl <sup>2</sup>	Assistant Professor				USDA	Animal Environmental and Waste Management
L. Davis Clements	Professor	0.37	0.13		0.50	Meat and Poultry By-products
Roger Eigenberg	Assistant Professor				USDA	Animal Environmental and Waste Management
Dean E. Eisenhauer	Professor	0.50		0.50		Surface Irrigation and Chemigation
Thomas G. Franti	Assistant Professor	0.25	0.75			Surface Water Management
John E. Gilley	Associate Professor				USDA	Soil Erosion
Robert D. Grisso	Professor	0.25	0.35	0.40		Agricultural Machinery
Milford A. Hanna	Professor	0.65		0.10	0.25	Food and Bioprocess Engineering
Terry A. Howell	Professor				USDA	Irrigation Scheduling
David D. Jones	Associate Professor	0.35		0.65		Product Handling and Storage
Michael F. Kocher	Associate Professor	0.40		0.60		Controls Engineer
Richard Koelsch	Assistant Professor	0.21	0.49		0.30	Livestock Bioenvironmental Engineering
Derrel L. Martin	Professor	0.65		0.35		Sprinkler Irrigation
Michael M. Meagher	Associate Professor			0.20	0.80	Bioprocess Engineering
George E. Meyer	Professor	0.60		0.40		Plant Growth Modeling
Jack A. Nienaber	Professor				USDA	Animal Calorimetry
Dennis D. Schulte	Professor	0.50		0.50		Pollution Control and Energy Systems
LaVerne Stetson	Professor				USDA	Agricultural Electricity
Mark Schrock	Professor				USDA	Agricultural Machinery
Darrell Watts	Professor	0.60	0.40			Water Quality/Irrigation
Curtis L. Weller	Associate Professor	0.60		0.20	0.20	Food and Bioprocess Engineering
Wayne Woldt	Associate Professor	0.25	0.50		0.25	Bioenvironmental Engineering

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
<b>Biometry</b>						
David B. Marx <sup>3</sup>	Professor	0.50		0.50		Head, Statistical Consultant
Anne Parkhurst <sup>4</sup>	Professor	0.50		0.50		Head, Statistical Consultant
Kent Eskridge	Professor	0.60		0.40		Statistical Consultant
Stephen D. Kachman	Associate Professor	0.75		0.25		Statistical Consultant
Walter W. Stroup	Professor	0.50		0.50		Statistical Consultant
Linda J. Young	Professor	0.75		0.25		Statistical Consultant

## Entomology

Z B Mayo <sup>3</sup>	Professor	0.80	0.20			Interim Head, Aphid Genetics
Sharron Quisenberry <sup>4</sup>	Professor	0.22	0.12	0.06	0.60	Head/Insect-Plant Interactions
Frederick P. Baxendale	Professor	0.25	0.75			Turf Insects
Dennis R. Berkebile	Assistant Professor				USDA	Livestock Entomology
Stephen D. Danielson	Associate Professor	0.75		0.25		Forage Insects
Mary Ellen Dix	Associate Professor				USDA	Shelterbelt Insects
John E. Foster	Professor	0.50	0.50			Insect Genetics
E.A. Heinrichs	Professor				1.00	Insect-Plant Interactions
Leon G. Higley	Professor	0.80		0.20		Insect Ecology
Scott Hutchins <sup>2</sup>	Professor				1.00	Integrated Pest Management
Wayne L. Kramer	Assistant Professor				1.00	Medical Entomology
Lance J. Meinke	Associate Professor	0.80		0.20		Soil Insects
Daniel Mollenbeck <sup>2</sup>	Assistant Professor				1.00	Plant Resistance to Insects
Frank Peairs	Professor				1.00	Insect-Plant Interactions
Richard D. Peterson	Assistant Professor				USDA	Livestock Entomology
Robert K. Peterson	Assistant Professor				1.00	Integrated Pest Management
Blair D. Siegfried	Associate Professor	0.80		0.20		Insect Toxicology
Steven R. Skoda	Assistant Professor				USDA	Livestock Entomology
C. Michael Smith <sup>2</sup>	Professor				1.00	Plant/Insect Interactions
David W. Stanley	Professor	0.78		0.22		Insect Physiology
David B. Taylor	Associate Professor				USDA	Livestock Entomology
Gustave D. Thomas	Professor				USDA	Livestock Entomology

<sup>1</sup>Ended research appointment during 1998-1999

<sup>2</sup>Began research appointment during 1998-1999

<sup>3</sup>Began head position during 1998-1999

<sup>4</sup>Ended head position during 1998-1999

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
<b>Food Science and Technology</b>						
Steve L. Taylor	Professor	0.40	0.34	0.26		Head, Food Toxicology
Andrew K. Benson	Assistant Professor	0.60		0.40		Food Microbiology
Mindy M. Brashears	Assistant Professor	0.30	0.70			Food Microbiology
Lloyd B. Bullerman	Professor	0.70	0.10	0.20		Food Microbiology/Mycology
Susan B. Cuppett	Professor	0.60		0.40		Food Lipids
Milford A. Hanna	Professor	0.20			0.80	Food and Bioprocess Engineering
Susan Hefle	Assistant Professor	1.00				Food Allergy Research
Robert W. Hutkins	Associate Professor	0.65		0.35		Food Biotechnology
David S. Jackson	Associate Professor	0.70	0.30			Cereals/Oilseeds Processing
Michael M. Meagher	Associate Professor	0.80			0.20	Food Engineering
Shelly McKee-Hensarling	Assistant Professor	0.70	0.15	0.15		Egg and Egg Products Hensarling
Vicki Schlegel	Assistant Professor	1.00				Quality Assurance
Durward A. Smith	Associate Professor	0.22	0.33		0.45	Horticultural Food Crops Processing
Curtis L. Weller	Associate Professor			0.20	0.80	Food and Bioprocess Engineering
Randy L. Wehling	Professor	0.50		0.50		Food Analysis
Michael G. Zeece	Professor	0.75		0.25		Food Protein Chemistry

## Horticulture

David T. Lewis	Professor	0.26	0.14	0.20	0.40	Head
Dermot P. Coyne	Professor	0.96		0.04		Vegetable Breeding
Gregory L. Davis	Assistant Professor	0.60		0.40		Sustainable Landscape
Roch E. Gaussoin	Associate Professor	0.25	0.75			Turfgrass Management and Physiology
Laurie Hodges	Associate Professor	0.40	0.60			Vegetable Production and Development
Garald L. Horst	Professor	0.75		0.25		Turfgrass Physiology and Management
Ellen T. Paparozzi	Professor	0.50		0.50		Ornamentals
Paul E. Read	Professor	0.65	0.15	0.20		Plant Tissue Culture and Viticulture
Terrance P. Riordan	Professor	0.89		0.11		Turf Breeding
Robert C. Shearman	Professor	0.70	0.30			Sustainable Turf Systems
Durward A. Smith	Associate Professor	0.18	0.27		0.55	Horticultural Food Crops Processing

## IANR Communications and Information Technology

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

<sup>1</sup>Ended research appointment during 1998-1999

<sup>2</sup>Began research appointment during 1998-1999

## Plant Pathology

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

## School of Natural Resource Sciences

Blaine L. Blad	Professor	0.80	0.10	0.10		Director
Robert F. Diffendal	Professor	0.25		0.75		Assistant Director
Jerry F. Ayers	Associate Professor	0.15			0.75	Geology
James R. Brandle	Professor	0.70		0.30		Forestry/Windbreaks
Ronald M. Case	Professor	0.25		0.75		Wildlife
Steven D. Comfort	Associate Professor	0.75	0.25			Soil Environmental Chemist
David C. Gosselin	Associate Professor	0.65		0.10	0.25	Earth Science
Mark O. Harrell	Associate Professor	0.25			0.75	Forest Entomology
Edwin F. Harvey	Assistant Professor	0.55		0.20	0.25	Hydrogeology
Michael J. Hayes	Assistant Professor	1.00				Agricultural Climatology
Gary L. Hergenrader	Professor	0.10	0.10	0.10	0.70	State Forester
Kyle D. Hoagland	Professor	0.75		0.25		Limnology
Kenneth G. Hubbard	Professor	0.70	0.20	0.10		Agricultural Climatology
Ron J. Johnson	Professor	0.31	0.69			Wildlife Management
Shripat T. Kamble	Professor	0.25	0.75			Pesticide Impact Assessment
Terrence B. Kayes	Associate Professor	0.25	0.75			Aquaculture
Robert D. Kuzelka	Associate Professor	0.35	0.35	0.30		Assistant Director, Water Center/ Environmental Programs
James W. Merchant	Professor	0.15		0.25	0.60	Geographic Information Systems
Steve J. Meyer	Assistant Professor	0.25	0.50	0.25		Agricultural Climatology
Darryll T. Pederson	Professor	0.50			0.50	Geology
Edward J. Peters	Professor	0.25		0.75		Fisheries
Donald C. Rundquist	Professor	0.25		0.35	0.40	Remote Sensing
Julie A. Savidge	Associate Professor	0.40		0.60		Wildlife
Michele M. Schoeneberger	Assistant Professor				USDA	Forestry
Patrick J. Shea	Professor	0.80		0.20		Environmental Chemistry of Xenobiotics
Roy F. Spalding	Professor	0.80		0.10	0.10	Hydrochemistry/Associate Director, Water Center/Environmental Programs
David E. Stooksbury <sup>1</sup>	Assistant Professor	1.00				Agricultural Climatology
Jozsef Szilagyi	Assistant Professor	0.25			0.75	Hydrogeology
Shashi B. Verma	Professor	0.60		0.15	0.25	Agricultural Meteorology

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
<b>School of Natural Resource Sciences (continued)</b>						
Edward F. Vitzthum	Associate Professor	0.20	0.65	0.15		Coordinator, Environmental Programs
Bob G. Volk <sup>1</sup>	Professor	0.75			0.25	Director, Water Center/Environmental Programs
Elizabeth A. Walter-Shea	Associate Professor	0.85		0.15		Agricultural Meteorology
David A. Wedin	Assistant Professor	0.40		0.60		Ecology
Albert Weiss	Professor	0.70	0.15	0.15		Agricultural Meteorology
Donald A. Wilhite	Professor	0.85		0.15		Agricultural Climatology
Chun Xun-Hong	Associate Professor	0.25		0.08	0.67	Hydrogeology

## Veterinary and Biomedical Sciences

John A. Schmitz	Professor	0.65	0.15	0.20		Head
Raul Barletta	Associate Professor	0.90		0.10		Molecular Biology
Lonty K. Bryant <sup>1</sup>	Instructor	0.25		0.50	0.25	Epidemiology
Jeffrey Cirillo	Assistant Professor	0.65	0.15	0.20		Infectious Diseases
Ruben O. Donis	Associate Professor	0.85		0.15		Molecular Virology
Alan R. Doster	Professor				1.00	Diagnostic Pathology
Gerald E. Duhamel	Professor	0.80		0.10	0.10	Diagnostic/Research Pathology
E. Denis Erickson <sup>1</sup>	Professor			0.30	0.70	Diagnostic Bacteriology
Jeffrey Gray <sup>2</sup>	Assistant Professor	0.40		0.20	0.40	Veterinary Microbiologist
Dee Griffin	Associate Professor		0.30	0.50	0.20	Beef Cattle Medicine
Clinton J. Jones	Professor	0.90		0.10		Molecular Virology
Clayton L. Kelling	Professor	0.85		0.15		Research Virology
Marjorie F. Lou	Professor	0.90		0.10		Research Biochemistry
Rodney A. Moxley	Professor	0.90		0.10		Diagnostic/Research Pathology
Fernando Osorio	Professor	0.60			0.40	Diagnostic/Research Virology
Douglas G. Rogers	Associate Professor			1.00		Diagnostic/Research Pathology
Gary P. Rupp	Professor	0.30		0.50	0.20	Director, GPVEC, Beef Cattle Medicine
Norman Schneider	Associate Professor		0.25	0.50	0.25	Toxicology
David Smith	Assistant Professor	0.25	0.75			Dairy and Beef Cattle Health
S. Srikumaran	Professor	0.85		0.15		Immunology
David Steffen	Associate Professor				1.00	Diagnostic Research Pathology
Robert Wills	Assistant Professor	0.25	0.65	0.10		Swine Diseases

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

### Family and Consumer Sciences

Shirley Baugher	Professor	0.37		0.52	0.11	Chair
Douglas A. Abbott	Professor	0.25		0.75		Youth at Risk
Richard Bischoff <sup>2</sup>	Assistant Professor	0.25		0.25	0.50	Collaborative Health Care
E. Raedene Combs	Professor	0.25		0.75		Housing, Aged
Sheran Cramer	Associate Professor	0.25		0.75		Women/Economic Security
Rochelle Dalla	Assistant Professor	0.25		0.75		Migration
Elizabeth Davis	Associate Professor	0.25		0.75		Family Economics
John D. DeFrain	Professor	0.25		0.50		Youth at Risk
Carolyn Edwards	Professor	0.25		0.37	0.38	Cultural Diversity/Early Childhood
William Meredith	Professor	0.25		0.25	0.50	Youth at Risk
Kathy Prochaska-Cue	Associate Professor	0.25	0.75			Family Management
Mary Ellen Rider	Assistant Professor	0.25	0.75			Consumer Health Policy
Stephen Russell <sup>1</sup>	Assistant Professor	0.25	0.75			Adolescent Development
Pauline Davey Zeece	Professor	0.25		0.75		Child Care

### Nutritional Science and Dietetics

Marilynn Schnepf	Associate Professor	0.40	0.10	0.50		Chair
Julie A. Albrecht	Associate Professor	0.25	0.75			Food Safety
Nancy M. Betts	Professor	0.50		0.50		Nutrition
Timothy Carr	Assistant Professor	0.50		0.50		Nutritional Biochemistry
Judy Driskell	Professor	0.50		0.50		Nutrition
Fayrene Hamouz	Associate Professor	0.30		0.70		Restaurant Management
Nancy M. Lewis	Associate Professor	0.44		0.56		Nutrition
Kaye Stanek	Associate Professor	0.25		0.75		Nutrition

### Textiles, Clothing and Design

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

<sup>1</sup>Ended research appointment during 1998-1999

<sup>2</sup>Began research appointment during 1998-1999

**Department  
(Area of Responsibility)**

**Rank                      Rsch    Ext    Tch    Other**

## Off-Campus Research Centers

### Northeast Research and Extension Center

John F. Witkowski	Professor	0.23	0.69		0.08	Director
Michael C. Brumm	Professor	0.50	0.50			Animal Science (Swine Production)
William L. Kranz	Assistant Professor	0.25	0.75			Biological Systems Engineering (Water Quality)
Terry L. Mader	Professor	0.50	0.50			Animal Science (Beef Cattle)
Charles A. Shapiro	Associate Professor	0.50	0.50			Agronomy (Soils and Crop Nutrition)
David P. Shelton	Professor	0.50	0.50			Biological Systems Engineering (Soil Conservation)

### Panhandle Research and Extension Center

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

### South Central Research and Extension Center

Alan Baquet	Professor	0.14	0.78		0.08	Director
Brian Benham	Assistant Professor	0.50	0.50			Biological Systems Engineering (Water Quality Management)
Roger Elmore	Professor	0.50	0.50			Agronomy (Crop Production)
Richard Ferguson	Associate 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	Associate Professor	0.50	0.50			Entomology (Biological Control)

<sup>1</sup>Ended research appointment during 1997-1998

<sup>2</sup>Began research appointment during 1997-1998

	Rank	Rsch	Ext	Tch	Other	Department (Area of Responsibility)
<b>Southeast Research and Extension Center</b>						
Randy Cantrell	Professor	0.05	0.87	0.08		Director
<b>West Central Research and Extension Center</b>						
Gary W. Hergert	Professor	0.50	0.50			Interim 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)
Jerre Johnson <sup>1</sup>	Professor				1.00	Veterinary and Biomedical Sciences (Pathology)
Thomas Long	Assistant Professor	0.50	0.50			Animal Science (Swine Genetics)
Dale T. Lindgren	Professor	0.50	0.50			Horticulture (Ornamentals)
Paul T. Nordquist <sup>1</sup>	Professor	1.00				Agronomy (Sorghum/Corn Breeding)
Nancy Norton	Instructor	0.50	0.50			Agricultural Economics (Farm/Ranch Management)
Jerry Volelsky	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 <sup>3</sup>	Associate Professor	0.20	0.65	0.15		Interim Director, Coordinator, Environmental Programs
Robert G. Volk <sup>1</sup>	Professor	0.75			0.25	Director
Shripat T. Kamble	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	Professor	0.12	0.13		0.75	Assistant Director
Steven S. Waller	Professor	0.50		0.50		Assistant Dean and Director; NCSARE Coordinator



# Visiting Scientists and Research Associates

**T**he Agricultural Research Division hosted 36 visiting scientists and 42 research associates to the campus in 1998-1999. 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

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

*Visiting Scientist:* Anna Gajda  
*Country:* Poland  
*Expertise/Discipline:* Soil microbiology

*Visiting Scientist:* S. A. Ipinge  
*Country:* Namibia  
*Expertise/Discipline:* Pearl millet breeding

*Visiting Scientist:* Peter Juroszek  
*Country:* Germany  
*Expertise/Discipline:* Weed spatial heterogeneity and population processes

*Visiting Scientist:* Miriam Gaceri Kinyua  
*Country:* Kenya  
*Expertise/Discipline:* Anther culture - wheat transformation systems

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

*Visiting Scientist:* Kedar Nath Rai  
*Country:* India  
*Expertise/Discipline:* Pearl millet breeding research

*Visiting Scientist:* Mangot Ram  
*Country:* India  
*Expertise/Discipline:* Root morphology

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

### Animal Science

*Visiting Scientist:* Gabriela Allegretti  
*Country:* Brazil  
*Expertise/Discipline:* Animal physiology

*Visiting Scientist:* Necmettin Ceylan  
*Country:* Turkey  
*Expertise/Discipline:* Nonruminant nutrition

*Visiting Scientist:* Eugene Eisen  
*Country:* United States/North Carolina  
*Expertise/Discipline:* Animal genetics

*Visiting Scientist:* Gamal Elsaarawi  
*Country:* Egypt  
*Expertise/Discipline:* Animal physiology

*Visiting Scientist:* Keigo Kuchida  
*Country:* Japan  
*Expertise/Discipline:* Animal genetics

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

*Visiting Scientist:* Abdul Rahuman Mohamed  
*Country:* Sri Lanka  
*Expertise/Discipline:* Animal physiology

*Visiting Scientist:* Alaha Singari Namburi  
*Country:* India  
*Expertise:* Ruminant nutrition

*Visiting Scientist:* Silvia Salado  
*Country:* Spain  
*Expertise/Discipline:* Nonruminant nutrition

*Visiting Scientist:* Wayne Singleton  
*Country:* United States/Indiana  
*Expertise/Discipline:* Animal genetics

*Visiting Scientist:* Mauricio Valencia Posadas  
*Country:* Mexico  
*Expertise/Discipline:* Animal genetics

## Biometry

*Visiting Scientist:* Mijung Kim  
*Country:* Korea  
*Expertise/Discipline:* Multivariate survival analysis

## Entomology

*Visiting Scientist:* Mohmoud Ali  
*Country:* Egypt  
*Expertise/Discipline:* Apiculture

*Visiting Scientist:* Michael Scharf  
*Country:* United States/Indiana  
*Expertise/Discipline:* Insecticide toxicology

## Plant Pathology

*Visiting Scientist:* Judith K. Brown  
*Country:* United States/Arizona  
*Expertise/Discipline:* Plant virology

*Visiting Scientist:* Graciela Godoy-Lutz  
*Country:* Dominican Republic  
*Expertise/Discipline:* Plant pathology, epidemiology and pathogen variability

*Visiting Scientist:* Deng Zinin  
*Country:* Italy  
*Expertise/Discipline:* Plant molecular biology

## School of Natural Resource Sciences

*Visiting Scientist:* Abraham Blum  
*Country:* Israel  
*Expertise/Discipline:* Plant physiology and crop breeding

*Visiting Scientist:* Hi-Ryong Byun  
*Country:* South Korea  
*Expertise/Discipline:* Drought monitoring/drought index development/meteorology

*Visiting Scientist:* Hesham Gaber  
*Country:* Egypt  
*Expertise/Discipline:* Soil chemistry

*Visiting Scientist:* T.R. Sinclair  
*Country:* United States/Florida  
*Expertise/Discipline:* Plant physiology and crop modeling

*Visiting Scientist:* Sandor Szalai  
*Country:* Hungary  
*Expertise/Discipline:* Drought monitoring

## Veterinary and Biomedical Sciences

*Visiting Scientist:* Lticia Garcia  
*Country:* Mexico  
*Expertise/Discipline:* Microbiology

## Family and Consumer Sciences

*Visiting Scientist:* Brian Husby  
*Country:* Calgary Alberta  
*Expertise/Discipline:* Contemporary family relations/qualitative research

*Visiting Scientist:* Rosario Esteinou  
*Country:* Mexico  
*Expertise/Discipline:* Family studies

## Northeast Research and Extension Center

*Visiting Scientist:* John Gaughan  
*Country:* Australia  
*Expertise/Discipline:* Beef cattle production

## Research Associates

### Agronomy

*Research Associate:* Tony Buhr  
*Country:* Nebraska, USA  
*Expertise/Discipline:* Regulation of gene expression in transgenic soybean

*Research Associate:* Anita Dieleman  
*State/Country:* Nebraska, USA  
*Expertise/Discipline:* Analyzing spatially referenced soil, topology, and pest site characterization data; develop herbicide treatment maps

*Research Associate:* Daniel Hagopian  
*State/Country:* Maine, USA  
*Expertise/Discipline:* Using remote sensing to detect nutrient deficiency in corn

*Research Associate:* Julie Huddle  
*State/Country:* Texas, USA  
*Expertise/Discipline:* Long-term vegetation in the Nebraska Sandhills; blowout penstemon

*Research Associate:* Won Jong Lee  
*State/Country:* Korea  
*Expertise/Discipline:* End-use quality of wheat/effects of environment on bread and noodle properties

*Research Associate:* Mark Liebig  
*State/Country:* Nebraska, USA  
*Expertise/Discipline:* Evaluation of soil quality indicators on long-term cropping systems

*Research Associate:* Li Lijia  
*State/Country:* China  
*Expertise/Discipline:* Construction and characterization of maize chromosome-specific libraries and probes

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

*Research Associate:* Richard Olson  
*State/Country:* Nebraska, USA  
*Expertise/Discipline:* Seminar series on farm-landscape watershed level methods

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

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

*Research Associate:* Yuan Xue  
*State/Country:* Illinois, USA  
*Expertise/Discipline:* Site-specific manure application and effects on air and soil quality

*Research Associate:* Charles Yamoah  
*State/Country:* Ghana  
*Expertise/Discipline:* Modeling agronomic rotations project

*Research Associate:* Zhanyuan Zhang  
*State/Country:* Nebraska, USA  
*Expertise/Discipline:* Attempts to improve efficiency of soybean transformation

### Animal Science

*Research Associate:* Sergio Gomez-Rosales  
*State/Country:* Mexico  
*Expertise/Discipline:* Nonruminant nutrition

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

### Horticulture

*Research Associate:* Shuizhang Fei  
*State/Country:* Nebraska, USA  
*Expertise/Discipline:* Turfgrass tissue culture and genetic transformation

*Research Associate:* Soon Oh Park  
*State/Country:* Nebraska, USA  
*Expertise/Discipline:* Classical and molecular genetic studies for disease resistance and other traits in common bean

*Research Associate:* Erika Szendrak  
*State/Country:* Nebraska, USA  
*Expertise/Discipline:* Plant tissue culture in orchids and woody ornamentals

## Plant Pathology

- Research Associate:* Ii-Rong Choi  
*State/Country:* Kentucky, USA  
*Expertise/Discipline:* Plant virology
- Research Associate:* Mike Graves  
*State/Country:* Oregon, USA  
*Expertise/Discipline:* Molecular virology
- Research Associate:* Chongxi Huang  
*State/Country:* China  
*Expertise/Discipline:* Molecular biology
- Research Associate:* Jeff Rollins  
*State/Country:* Indiana, USA  
*Expertise/Discipline:* Fungal molecular genetics
- Research Associate:* Allen Szalanski  
*State/Country:* Nebraska, USA  
*Expertise/Discipline:* Nematode molecular systematics
- Research Associate:* Lingyu Zhang  
*State/Country:* China  
*Expertise/Discipline:* Wheat transformation
- Research Associate:* Yange Zhang  
*State/Country:* China  
*Expertise/Discipline:* Molecular biology
- Research Associate:* YuanZheng Zhang  
*State/Country:* China  
*Expertise/Discipline:* Algal viruses
- Research Associate:* Zhongge Zhang  
*State/Country:* Nebraska, USA  
*Expertise/Discipline:* Biological control of plant diseases

## Veterinary and Biomedical Sciences

- Research Associate:* Ofelia Chacon  
*State/Country:* Columbia  
*Expertise/Discipline:* Pathobiology/microbiology - veterinary medicine
- Research Associate:* Emil Berberov  
*State/Country:* Bulgaria  
*Expertise/Discipline:* Microbiology/genetics

*Research Associate:* Xiaoxing Ching  
*State/Country:* China  
*Expertise/Discipline:* Microbial genetics/pathogenesis

*Research Associate:* Seung Chon  
*State/Country:* Korea  
*Expertise/Discipline:* Veterinary virology

*Research Associate:* Renee Dewell  
*State/Country:* USA  
*Expertise/Discipline:* Veterinary medicine

*Research Associate:* Sandra Fernandez  
*State/Country:* Argentina  
*Expertise/Discipline:* Molecular bacteriology

*Research Associate:* Mohammad A. Honain  
*State/Country:* Bangladesh  
*Expertise/Discipline:* Infectious diseases

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

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

*Research Associate:* Daniel Perez  
*State/Country:* Argentina  
*Expertise/Discipline:* Molecular virology

*Research Associate:* Madeline Roberts  
*State/Country:* USA  
*Expertise/Discipline:* Molecular endocrinology

*Research Associate:* Homayoon Shams  
*State/Country:* Iran  
*Expertise/Discipline:* Cellular immunology

*Research Associate:* Ventsislav B. Vassilev  
*State/Country:* Bulgaria  
*Expertise/Discipline:* Molecular biology

*Research Associate:* Yang Zhang  
*State/Country:* China  
*Expertise/Discipline:* Bovine virology

# Research Projects

**E**ach faculty member with an ARD appointment has a federally-approved research project. A number of faculty have multiple projects. There are 374 research projects that were active for all or part of the 1998-1999 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 51 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 65 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 1998-1999.

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

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

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

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

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

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

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

**Competitive Grants:** includes research in USDA national priority areas.

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

## Agricultural/ Natural Resources Units

### Agricultural Economics

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

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

**\*10-121 ha**  
Sustainable communities: community response to institutional change (J.C. Allen)

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

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

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

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

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

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

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

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

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

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

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

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

## Agricultural Leadership, Education and Communication

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

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

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

## Agronomy

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

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

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

**\*12-173 ha**  
Evaluating plant nutrient needs and product quality (K.D. Frank)

**\*12-174 rr**  
Market quality of hard wheat for domestic and international foods (D.R. Shelton)

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

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

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

**\*12-195 ha**  
Biometrical genetics, selection theory and methods and germplasm improvement in maize (B.E. Johnson)

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

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

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

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

**\*12-203 ha**  
Flow of water and particles in soils and porous media (D. Swartzendruber)

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

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

**\*12-224 ha**  
Soil and crop management effects on the nitrogen cycle (D.T. Walters)

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

**\*12-226 ha**  
Determination of carbon tetrachloride transport coefficients in porous media (J.H. Skopp)

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

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

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

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

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

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

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

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

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

**\*12-247 cg**  
An ecophysiology approach to understanding maize tolerance and weed suppressive ability (D.A. Mortensen, J.L. Lindquist, B.E. Johnson)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## Biochemistry

- \*15-022 rr**  
Regulation of photosynthetic processes (R. Chollet)
- \*15-040 rr**  
Regulation of photosynthetic processes (J.P. Markwell)
- \*15-067 ha**  
Regulation of photosynthetic processes (R. Spreitzer)
- \*15-069 ha**  
Chloroplast thylakoid protein phosphatase (J.P. Markwell)
- 15-070 st**  
Development of dicamba-tolerant plants (D.P. Weeks, P.L. Herman)
- \*15-071 cg**  
Genetic modification of chloroplast rubisco (R.J. Spreitzer)
- \*15-072 cg**  
Enzymes influencing leghemoglobin in legumes (R.V. Klucas, G. Sarath)
- 15-073 rr**  
Diversity and interaction of beneficial bacterial and fungi in the rhizosphere (R.V. Klucas)
- 15-076 ha**  
Hemoglobins in higher plants (R.V. Klucas)
- 15-078 ha**  
Genetic modification of chloroplast rubisco (R.J. Spreitzer)
- 15-080 ha**  
Characterization of human telomerase (C.M. Price)
- 15-081 ha**  
Symbiosome proteins from soybean root nodules (G. Sarath)
- 15-082 cg**  
Rubisco phylogenetic correction (R.J. Spreitzer)
- 15-083 cg**  
The role of a family of nuclear-encoded sigma factors in plastid transcription regulation (L.A. Allison)
- 15-084 st**  
Redox control of biological activity (S.W. Ragsdale)
- 15-085 ha**  
Regulation of transcription in plastids of higher plants (L.A. Allison)
- 15-086 ha**  
B<sub>12</sub> enzymes and hyperhomocysteinemia (R. Banerjee)

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

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

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

## 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)

**\*13-071 ha**  
Utilization of byproducts in grain diets fed to feedlot cattle (T. Milton, T.J. Klopfenstein, T.L. Mader)

**13-086 ha**  
Sustainable beef growing-finishing systems (T.J. Klopfenstein, T. Milton)

**13-087 ah**  
Relationship of subfunctional corpora lutea to frequency of LH pulses during the periovulatory period of cattle (J.E. Kinder)

**13-096 rr**  
Forage protein characterization and utilization for cattle (T.J. Klopfenstein, L.F. Moser)

**13-101 ha**  
Genetic variation for reproduction and energy utilization (M.K. Nielsen)

**13-104 ha**  
Optimizing the utilization of dietary fiber and lipids by dairy cows (R. J. Grant)

**13-105 ha**  
Nutrition of prolific sows (A.J. Lewis, P.S. Miller)

**13-110 rr**  
Molecular mechanisms regulating skeletal muscle growth and differentiation (S.J. Jones)

**13-115 ha**  
Evaluation of cow/calf weaning management systems to improve economic efficiency (R.J. Rasby, T.J. Klopfenstein, T. Milton, C.R. Calkins)

**13-118 ha**  
Factors affecting calcium transport in the avian small intestine and egg shell quality (S.S. Scheideler)

**13-119 ha**  
Nitrogen metabolism in *Prevotella ruminicola*: a molecular genetics approach (M. Morrison)

**13-120 ha**  
Testicular modulation of luteinizing hormone secretion (R.J. Kittok, J.E. Kinder, H.E. Grotjan)

**13-122 ha**  
Gastrointestinal structure and function as related to nutrition and body metabolism (E.T. Clemens)

**13-123 ah**  
Estrogen-calcium relationships during onset of metabolic bone disease in laying hens (M.M. Beck)

**\*13-124 cg**  
Molecular biology of protein degradation and utilization by *Prevotella ruminicola* (M. Morrison)

**\*13-125 cg**  
Persistent ovarian follicles: role of progestins and LH in cows (J.E. Kinder)

**13-126 ha**  
Physiological and management aspects of expression of estrus and ovulation rate in swine (D.R. Zimmerman)

**13-127 ha**  
Measurement and manipulation of carcass traits and influencing fresh meat value (C.R. Calkins)

**13-128 ah**  
Transfer of antibiotic resistance genes between bacteroides and *Prevotella* species (M. Morrison)

**13-129 rr**  
Positional and functional identification of economically important genes in the pig (D. Pomp)

**13-130 ha**  
Physiological and nutritional aspects of improving reproduction in dairy cattle (L.L. Larson)

**13-131 cg**  
Screening the pig genome for QTL controlling reproduction (D. Pomp, R.K. Johnson)

**\*13-132 st**  
Development of flow-sorted chromosome specific pools for mapping disease and production genes in pigs (D. Pomp, S. Jones, K. Arumuganathan)

**13-133 cg**  
Molecular and kinetic analyses of the adherence of *Ruminococcus albus* B to cellulose (M. Morrison, R. Grant)

**13-134 rr**  
Integration of quantitative and molecular technologies for genetic improvement of pigs (R.K. Johnson, D. Pomp)

**13-135 ha**  
Recombinant bovine and equine gonadotropins (H.E. Grotjan)

**13-136 cg**  
Synthesis and assembly of cellulose binding proteins by *Ruminococcus albus* (M. Morrison)

**13-137 cg**  
Recombinant bovine gonadotropins (H.E. Grotjan, J.E. Kinder)

**13-138 cg**  
Molecular biology of protein degradation and utilization by *Prevotella ruminicola* (M. Morrison)

**13-139 ha**  
Regulation of gonadotropin synthesis and secretion, ovarian follicular development and testicular function pre- and post-puberty (J.E. Kinder)

**13-140 ha**  
Role of adipose tissue in determining energy utilization in cattle (J.L. Miner)

**13-141 ha**  
Nutritional management strategies for sustainable feedlot cattle production (T. Milton, T.J. Klopfenstein, T.L. Mader)

**13-142 ha**  
Value-added processed and manufactured meat products (R.W. Mandigo)

**13-143 rr**  
Enhancing the global competitiveness of U.S. red meat (C.R. Calkins, D.M. Feuz)

**13-144 ha**  
Utilization of phosphorus in cool- and warm-season grass hay by ruminants (D.R. Brink)

**13-145 rr**  
Genetic enhancement of health and survival for dairy cattle (J.F. Keown)

**13-146 ha**  
Factors affecting calcium utilization in the avian and egg shell quality (S.E. Scheideler)

**13-147 ha**  
Interrelationships among liver metabolism, nutrient intake, and growth criteria in growing-finishing barrows and gilts (P.S. Miller, A.J. Lewis)

**13-148 ha**  
Improving the efficiency of nitrogen and amino acid utilization by pigs (A.J. Lewis, P.S. Miller)

**15-087 rr**  
Regulation of photosynthetic processes  
(R. Chollet, J.P. Markwell,  
R.J. Spreitzer)

**15-088 ha**  
Enzymology of anaerobic CO<sub>2</sub> fixation  
and bioremediation (S. Ragsdale)

## Biological Systems Engineering

**11-001 st**  
Evaluation of performance of new  
tractors (L.L. Bashford)

**11-044 rr**  
Improvement of thermal processes for  
food (M.A. Hanna)

**11-079 ha**  
Agricultural tractor testing board:  
policies and procedures (L.L. Bashford,  
M.F. Kocher, R.D. Grisso)

**\*11-093 ha**  
Development and evaluation of sensors  
and control systems for seed handling  
and delivery (M.F. Kocher)

**\*11-094 ha**  
Use of global positioning system in pro-  
duction agriculture (L.L. Bashford)

**\*11-096 ha**  
Waste management: disposal site  
characterization and hazard assessment  
(W.E. Woldt)

**11-097 ha**  
Protein film production and evaluation  
(C.L. Weller)

**\*11-098 rr**  
Integrated systems for improved water  
and nitrogen management in irrigation  
environments (D.L. Martin, D.G. Watts,  
N.L. Klocke)

**11-099 ha**  
Improving field productivity and predict-  
ing energy requirements of soil-engaging  
equipment (R.D. Grisso, M.F. Kocher,  
L.L. Bashford)

**\*11-101 cg**  
Program management and planning for  
advanced materials from renewable  
resources (L.D. Clements)

**11-102 ha**  
Identification, modeling, and design of  
plant sensor systems for variable-rate  
chemical application (G.E. Meyer)

**11-103 ha**  
Managing atrazine runoff losses to  
improve surface water quality  
(T.C. Franti)

**11-105 st**  
Safe and efficient use of electrical en-  
ergy for irrigation, livestock, and  
poultry facilities (L. Stetson)

**\*11-106 st**  
Whole farm nutrient budgeting for  
livestock systems (R.K. Koelsch,  
M.C. Brumm, J.A. Nienaber)

**11-107 ha**  
Bovine rumen contents as a source of  
industrial enzymes and chemicals  
(L.D. Clements)

**11-108 sg**  
Using army ammunition plants to pro-  
cess agricultural materials into industrial  
products (L.D. Clements)

**11-109 ha**  
Whole farm nutrient balance for live-  
stock production systems (R.K. Koelsch)

**11-110 ha**  
Variability in metering devices used in  
site specific crop management schemes  
(L.L. Bashford)

**11-111 st**  
Characterization and modeling of odor  
emissions from animal production faci-  
ties (D.D. Schulte, S.B. Verma,  
D. Billesbach, R.K. Koelsch)

**11-112 ha**  
Hydrologic modeling and engineering  
for enhancement of vegetative riparian  
buffers (D.E. Eisenhauer)

**11-113 ha**  
Uptake and metabolic effects of pesti-  
cide combinations on mammalian sys-  
tems (R.M. Brand)

**11-114 ha**  
Consideration of imprecision in pollution  
prevention system engineering  
(W.E. Woldt)

**11-115 ha**  
Improved anaerobic lagoon design and  
management for odor control  
(D.D. Schulte)

**11-116 ha**  
Engineering problems of flow measure-  
ment and control in agricultural indus-  
tries (M.F. Kocher)

**11-117 ha**  
Application of fuzzy systems analysis in  
biological systems engineering  
(D.D. Jones)

**11-118 ha**  
Development of simulation and optimiza-  
tion models for watershed management  
(D.L. Martin)

## Biometry

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

**23-002 rr**  
Stress factors of farm animals and their  
effects on performance (A.M. Parkhurst)

**23-003 st**  
Innovative design and analysis of agri-  
cultural experiments (W.W. Stroup,  
E.T. Paparozzi)

## Entomology

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

**17-054 ha**  
Biochemistry and physiology of lipids,  
prostaglandins, and related eicosanoids  
in insects (D.W. Stanley)

**\*17-060 rr**  
A national agricultural program to clear  
pest management agents for minor use  
(S.T. Kamble)

**17-061 st**  
Management of fly population densities  
in cattle feedlots to reduce adverse im-  
pacts (C.D. Thomas, J.J. Petersen,  
S.R. Skoda)

**17-062 ha**  
Arthropods associated with buffalograss  
and other turfgrasses in Nebraska  
(F.P. Baxendale)

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

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

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

**17-068 ha**  
Mechanisms and management of arthro-  
pod injury to plants (L.C. Higley)

**17-069 cg**  
Diagnostic techniques for monitoring Bt  
resistance in the European corn borer  
(B.D. Siegfried)

**17-070 ha**  
Bio-intensive pest management of the  
greenbug (Z B Mayo)

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

**17-072 ha**  
Ecology and management of *Diabrotica*  
species (L.J. Meinke)

**17-073 rr**  
Dynamic soybean insect management for  
emerging agricultural technologies and  
variable environments (L.C. Higley)

## Food Science and Technology

**16-044 rr**  
Molecular mechanisms regulating  
skeletal muscle growth and differentia-  
tion (M.C. Zeece)

**16-051 ha**  
Starch technology: production, charac-  
terization, and utilization (D.S. Jackson)

**16-054 ha**  
Chemical and physical quality charac-  
teristics of horticultural crops and their  
products (D.A. Smith)

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

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

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

**16-066 ha**  
Analytical methods for food process con-  
trol and measurement of processing  
induced changes (R.L. Wehling)

**\*16-067 rr**  
Marketing and delivery of quality cereals  
and oilseeds (L.B. Bullerman,  
D. Jackson)

**16-068 cg**  
Fate of fumonisin B<sub>1</sub> in heat processed  
corn products (L.B. Bullerman,  
M.A. Hanna)

**16-069 ha**  
Role of proteolysis in myofibrillar/cy-  
toskeleton 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)

**\*16-072** st  
Identification of low temperature-induced genes in *Listeria monocytogenes* (A.K. Benson, R.W. Hutkins)

**\*16-073** cg  
Enhancement of capillary electrophoresis (M.G. Zeece, D. Hage)

**16-075** st  
Coupling of molecular recognition and signal generation in arrayed fluorescent hybridization assays (A.K. Benson)

**16-076** cg  
Detecting internal insect infestation in wheat by near-infrared spectroscopy (R.L. Wehling)

**16-077** ha  
Genetics and biochemistry of stress-response systems in gram-positive bacteria and foodborne pathogens (A.K. Benson)

**16-078** ha  
Evaluation and characterization of antioxidants from plant sources (S.L. Cuppett)

**16-079** st  
Mapping and site-directed mutagenesis of IgE epitopes in a food allergen from soybean (Gly m Bd 30k) (M.G. Zeece, J.P. Markwell, G. Sarath, D.E. Wylie)

**16-080** ha  
Competitive inhibition of food-borne pathogens in meat and poultry products and in cattle (M.M. Brashears)

**16-081** cg  
Genomic analysis of *E. coli* 0157:H7 populations from cattle and humans (A.K. Benson, R.W. Hutkins)

**16-082** rr  
Marketing and delivery of quality cereals and oilseeds (D.S. Jackson)

**16-083** rr  
Marketing and delivery of quality cereals and oilseeds (L.B. Bullerman)

## Horticulture

**20-040** rr  
Genetic improvement of beans (*Phaseolus vulgaris* L.) and nutritional value for yield, pest resistance and nutritional value (D.P. Coyne, J.R. Steadman)

**20-048** ha  
Influence of sulfur and nitrogen on the growth and development of ornamental plants (E.T. Paparozzi)

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

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

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

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

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

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

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

**20-060** ha  
Breeding and development of buffalograss for the Central Great Plains (T.P. Riordan)

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

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

## Plant Pathology

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

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

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

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

**\*21-053** ha  
PCR based approaches for identification and epidemiology of parasite nematodes (T.O. Powers)

**\*21-054** sg  
Genetic basis for pathogenicity in the genus *Colletotrichum* (M.B. Dickman)

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

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

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

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

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

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

**\*21-065** sg  
Biological control of *Sclerotinia sclerotiorum* on legumes in the North Central Region (G.Y. Yuen, J.L. Parke)

**\*21-066** st  
Ultraviolet dosimetry in crop canopies (G.Y. Yuen, G.L. Horst, K.G. Hubbard, E.A. Walter-Shea)

**\*21-067** st  
Molecular analysis of programmed cell death in plants (M.B. Dickman)

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

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

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

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

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

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

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

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

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

## School of Natural Resource Sciences

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

**\*12-230** ha  
Transport, reactions, and fate of organic contaminants in soil (S.D. Comfort)

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

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

**\*26-023** ms  
Windbreak shelter effects (J.R. Brandle, L. Hodges)

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

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

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

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

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

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

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

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

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

**\*27-015 sg**  
Developing drought mitigation and preparedness technologies in the U.S. (D.A. Wilhite)

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

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

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

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

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

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

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

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

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

## Veterinary and Biomedical Sciences

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

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

**14-039 st**  
Research laboratory and animal care facility (J.A. Schmitz, A. Hogg, T.E. Socha)

**14-059 st**  
Veterinary diagnostic lab system: diagnostic surveillance and disease investigation in Nebraska livestock and poultry (J.A. Schmitz, A.R. Doster, J.L. Johnson, D.M. Grotelueschen)

**14-077 ah**  
Molecular genetics analysis of *Mycobacterium paratuberculosis* and related mycobacterial pathogens (R.G. Barletta)

**14-078 ah**  
Role of group A bovine rotavirus P protein antigenic epitopes in immunity and infection (G.E. Duhamel)

**\*14-081 cg**  
Analysis of the bovine herpes virus I latency related gene (C. Jones)

**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)

**\*14-088 cg**  
Analysis of BHV-1 gene expression during reactivation from latency (C.J. Jones)

**\*14-089 cg**  
Role of group A bovine P protein in induction of heterotypic immunity (G.E. Duhamel)

**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 choleraesuis* (R.W. Wills, F.A. Osorio)

**14-096 ah**  
Functional analysis of the BHV-1 latency related gene (C. Jones)

**14-097 cg**  
Functional analysis of bovine herpes virus I latency related gene products (C. Jones)

**14-098 st**  
Monitoring individual animal performance to evaluate beef cattle production and economics (G.P. Rupp, D.D. Griffin)

**14-099 cg**  
Cis-acting elements in the replication of the bovine viral 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 enterotoxin-I in diarrhea and septicemia in swine (R.A. Moxley, R.G. Barletta)

**14-102 ha**  
Strategic plan for an IANR field disease research program at the Department of Veterinary and Biomedical Sciences (D.R. Smith)

**14-103 ah**  
Pathogenic mechanisms of bacterial respiratory pathogens (J.D. Cirillo)

## Human Resources and Family Sciences Departments

### Family and Consumer Sciences

**\*92-018 ha**  
The infant as a group participant (J. Karns)

**\*92-019 sg**  
Housing affordability in rural areas (K. Prochaska-Cue, E.R. Combs, E.P. Davis)

**92-020 rr**  
The role of housing in rural community vitality (E.R. Combs)

**92-021 ha**  
Impact of Head Start on rural children, families, and communities (P.D. Zeece)

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

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

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

**92-026 ha**  
Surviving and transcending a traumatic childhood (J. DeFrain)

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

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

**\*92-030 st**  
High hopes and bright futures: successful teens in Nebraska (W.H. Meredith, D.A. Abbott, K. Lodl, C. Heusel)

**92-031 ha**  
Economic impact of HIV/AIDS on Nebraskans (M.E. Rider)

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

**92-033 ha**  
Into the heartland: a contextual examination of migration and its impacts on rural Nebraska meat-packing communities (R.L. Dalla)

**92-034 ha**  
Three cohorts of teenage mothers regional comparisons and sex education (S.T. Russell)

## Nutritional Science and Dietetics

**\*91-041 ha**  
Meat cookery and quality concepts for the foodservice industry (F. Hamouz)

**91-042 rr**  
Bioavailability of nutrients: a key to human nutrition (J.A. Driskell)

**91-043 rr**  
Health maintenance aspects of dietary recommendations designed to modify lipid metabolism (N.M. Lewis)

**91-044 cg**  
Dietary trans fatty acid influence on atherosclerosis and sterol metabolism (T.P. Carr)

**91-045 rr**  
Using stages of change model to promote consumption of grains, vegetables and fruits by young adults (N.M. Betts)

**91-046 ha**  
Exercise dependence and disordered eating behaviors: instrument development validation and testing (N.M. Betts)

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

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

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

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

## Textiles, Clothing and Design

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

**94-020 ha**  
Situational and personal factors in residential waste management: the impacts of markets, resources, and attitudes (S.M. Niemeyer)

**94-021 rr**  
Family business: interaction of work and family spheres (R.C. Kean)

**94-022 ha**  
Development of textile end-uses for wheat gluten and other farm commodity derived materials (L.E. Hamilton)

**94-023 rr**  
Development of textile materials for environmental compatibility and human health and safety (P.C. Crews)

**94-024 ha**  
Impacts of environmental disclosure policies and constraints on housing transaction practices (S. Niemeyer)

**94-025 rr**  
Development of textile materials for environmental compatibility and human health and safety (L. Scheyer)

## Off-Campus Research Centers

## Northeast Research and Extension Center

**42-007 ha**  
Management considerations for feedlot cattle exposed to environmental stressors (T.L. Mader, C.T. Milton)

**42-014 ha**  
Biology and control of the European corn borer bean leaf beetle and other selected insects in northeast Nebraska (J.F. Witkowski)

**\*42-016 ha**  
Management practices to enhance performance of weaned pigs (M.C. Brumm, D.P. Shelton)

**42-017 ha**  
Determination of crop residue cover using electronic image analysis (D.P. Shelton)

**42-018 rr**  
Integrated crop management effects on stalk-boring Lepidoptera (J.F. Witkowski)

**42-020 ha**  
Effects of preplant tillage and nitrogen application method on nitrate leaching (W.L. Kranz)

**42-021 ha**  
Development of integrated pest management techniques for improved weed management (D.L. Holshouser)

**42-022 cg**  
Dynamic responses of feedlot cattle exposed to heat stress (T.L. Mader, D. E. Spicers, J.A. Nienaber, J.L. Morrow-Tesch, A.M. Parkhurst)

**42-023 ha**  
Modifying pig performance through facility and diet management (M.C. Brumm)

**42-024 ha**  
Utilizing animal manures and fertilizers in cropping systems for northeast Nebraska (C.A. Shapiro)

## Panhandle Research and Extension Center

**44-004 st**  
Fertilizer and manure application for production of continuous corn (D.D. Baltensperger)

**44-016 ha**  
Weed control systems for western Nebraska irrigated crops and rangeland (R.G. Wilson)

**44-035 ha**  
Feed resources and beef production systems in western Nebraska to optimize total efficiency (I.G. Rush, B.A. Weichenthal)

**44-042 ha**  
Agricultural enhancement of potato production and utilization (A.D. Pavlista)

**\*44-046 ha**  
Nutrient management of irrigated and dryland crops in western Nebraska (J.M. Blumenthal)

**\*44-048 ha**  
Control of rhizomania and nematode diseases in sugar beet (E.D. Kerr)

**44-050 ha**  
Improvement of proso millet and other crops for western Nebraska (D.D. Baltensperger)

**44-051 ha**  
Agrichemical control in irrigation runoff water from surface irrigated fields (C.D. Yonts, R.G. Wilson)

**44-052 ha**  
The economics of alternative beef cattle marketing and feeding strategies (D.M. Feuz)

**44-053 ha**  
Machinery systems management for sugarbeets, dry edible beans, and chicory (J. Smith, R.C. Wilson)

**44-054 rr**  
Plant germplasm and information management and utilization (D.D. Baltensperger)

**44-055 ha**  
Intensification of winter wheat based dryland cropping systems for western Nebraska (D.J. Lyon)

**44-056 st**  
Taking advantage of winter wheat protein premium through late-season nitrogen fertilization (J.M. Blumenthal, D.M. Feuz, E.D. Kerr)

**44-057 ha**  
Studies of drought and defoliation effects on range grasses needed to optimize future grazing research (P.F. Reece, W.H. Schacht, J.D. Volesky, L.E. Moser)

**44-058 ha**  
Integrated management systems for arthropod pests of wheat and other crops in western Nebraska (G.L. Hein)

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

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

## South Central Research and Extension Center

### 48-016 ha

Soybean production practices and alternative crops within resource-efficient cropping systems for south central Nebraska (R. W. Elmore)

### 48-019 ha

Managing weeds and herbicides for profitable crop production and reduced environmental risks (F.W. Roeth)

### \*48-020 ha

Nitrogen management factors influencing utilization efficiency and loss processes to the environment (R.B. Ferguson)

### 48-022 ha

Crop insect pest management in Nebraska: biological control and sampling (R.J. Wright)

### 48-023 ha

Formulation of nitrogen fertilization recommendations to maximize economic and environmental goals (R.A. Selley)

### 48-024 cg

Epidemiology and life history of *Claviceps africana* in the Great Plains (J.P. Stack)

### 48-025 ha

Subsurface drip irrigation: Integrated water and nitrogen BMPs for corn and assessing irrigation uniformity in situ (B.L. Benham)

## West Central Research and Extension Center

### 43-042 ha

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

### 43-047 ha

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

### \*43-055 ha

Weed control management in reduced tillage systems (G.A. Wicks)

### \*43-056 ha

Interaction of trace minerals as related to prenatal supplementation of the pregnant beef cow (J.L. Johnson)

### 43-057 ha

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

### 43-058 ha

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

### 43-059 ha

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

### 43-060 rr

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

### 43-061 ha

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

### 43-062 ha

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

### 43-063 ha

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

### 43-064 st

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

### 43-065 ha

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

### 43-066 ha

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

### 43-067 ha

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

## Interdisciplinary Activities

### Administration

#### 01-001

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

#### 01-004

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

## Agricultural Research and Development Center

#### 45-001 st

Field laboratory development (D. Duncan)

## Center for Grassland Studies

#### 33-001 st

Center for grassland studies (M.A. Massengale)

## Center for Sustainable Agriculture Systems

#### 31-002 st

Center for sustainable agricultural systems (C.A. Francis)

#### 31-003 cg

Biological and economic consequences of flexible crop rotations (C.A. Francis)

#### 31-004 sg

Integrated crop/livestock research for sustainable systems (C.A. Francis, T.J. Klopfenstein, J. Brandle)

#### 31-005 sg

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

## Food Processing Center

#### 19-003 st

Development and evaluation of food products, processes and markets (S.L. Taylor)

#### 19-004 sg

Midwest food manufacturing alliance (S.L. Taylor)

#### \*19-005 sg

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

#### \*19-007 sg

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

#### 19-008 sg

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

## Industrial Agricultural Products Center

#### 29-007 sg

Industrial agricultural products center (M.A. Hanna)

#### 29-008 st

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

# Publications

**W**hile 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 1998. 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 1998.

## Journals in which faculty have published in 1998

### Agricultural Economics

Agricultural Economics: An International Journal  
American Journal of Agricultural Economics  
Economic Development Review  
Journal of Agricultural Economics  
Journal of Range Management  
Journal of Socio-Economics

### Agricultural Leadership, Education and Communication

Psychological Reports

### Agronomy

Agriculture, Ecosystem and Environment  
Agronomy Journal  
American Journal of Botany  
American Midland Naturalist  
Cereal Chemistry  
Communication of Soil Science and Plant Analyses  
Crop Science

Field Crop Research  
Food Science and Biotechnology  
Geoderma  
Great Plains Research  
Journal of Agricultural Sciences  
Journal of Environmental Quality  
Journal of Heredity  
Journal of Plant Nutrition  
Journal of Production Agriculture  
Journal of Range Management  
Plant Disease  
Plant Journal  
Soil Biology and Biochemistry  
Soil Science  
Soil Tillage Research  
Theoretical Applied Genetics  
Transactions of the American Society of Agricultural Engineers  
Trends in Food Science and Technology  
Weed Science  
Weed Technology

### Animal Science

American Midland Naturalist  
American Reproductive Science  
Animal Science (British)  
Brazilian Journal of Genetics  
Crop Science  
Domestic Animal Endocrinology  
Journal of Animal Science

Journal of Applied Poultry Research  
Journal of Bacteriology  
Journal of Dairy Science  
Journal of Food Science  
Journal of Range Management  
Journal of Reproductive Fertility  
Meat Science  
Nutritional Research  
Poultry Science  
Theriogenology  
Transactions of the American Society of Agricultural Engineers

## **Biochemistry**

Acta Cryst  
Biochemistry  
Journal of Biological Chemistry  
Journal of Food Agriculture Immunology  
Journal of Inherited Metabolic Disorders  
Journal of Insect Physiology  
Phytochemical Analyses  
Plant Physiology  
Protein Expression Purification

## **Biological Systems Engineering**

Cereal Chemistry  
Ground Water  
Industrial Crops and Products  
Industrial and Engineering Chemistry Research  
Journal of Agriculture and Food Chemistry  
Journal of Cereal Science  
Journal of Food Quality  
Journal of Food Science  
Journal of Investigative Dermatology  
Journal of Pharmaceutical Sciences  
Lebensmittel-ese nichaft und Technolgie  
Transactions of the American Society of Agricultural Engineers

## **Biometry**

Applied Biochemistry Biotechnology  
Cereal Chemistry  
Crop Science  
HortTechnology  
Journal of the American Dietetic Association  
Journal of American Society of Horticultural Science  
Journal of Animal Science  
Journal of Cereal Sciences  
Journal of Dairy Science

Journal of Food Quality  
Journal of Food Science  
Journal of Range Management  
Soil and Tillage Research  
Transactions of the American Society of Agricultural Engineers

## **Entomology**

Agronomy Journal  
American Midland Naturalist  
American Zoology  
Canadian Journal of Zoology  
Crop Protection  
Entomological Experimentalis et Applicata  
Environmental Entomology  
Environmental Toxicology and Chemistry  
Insect Biochemistry and Molecular Biology  
Genetic Analysis: Biomolecular Engineering  
Journal of Agricultural Entomology  
Journal of Economic Entomology  
Journal of Entomological Science  
Journal of Insect Physiology  
Journal of Kansas Entomological Society  
Journal of Lepidopterists' Society  
Journal of Medical Entomology  
Journal of Pesticide Biochemistry and Physiology  
Pesticide Biochemistry and Physiology

## **Food Science and Technology**

Applied and Environmental Microbiology  
Applied Biochemistry Biotechnology  
Cereal Chemistry  
Food and Chemical Toxicology  
Industrial Crops and Products  
Industrial and Engineering Chemistry Research  
Journal of Agriculture and Food Chemistry  
Journal of American Oil Chemists Society  
Journal of AOAC International  
Journal of Applied Microbiology  
Journal of Bacteriology  
Journal of Cereal Science  
Journal of Chromatography  
Journal of Food Agriculture Immunology  
Journal of Food Mycology  
Journal of Food Protection  
Journal of Food Quality  
Journal of Food Science  
Mycopathologia  
Poultry Science  
Protein Expression Purification  
Transactions of the American Society of Agricultural Engineers

## **Horticulture**

Crop Science  
Environmental Pollution  
Hort Science  
HortTechnology  
Journal of American Society for Horticultural Science  
Journal of Economic Entomology  
Journal of the Kansas Entomology Society  
Phytopathology

## **Plant Pathology**

Biological Chemistry  
Canadian Journal of Zoology  
Crop Protection  
Crop Science  
Journal of Biological Chemistry  
Journal of the American Society for Horticultural Science  
Journal of Medical Entomology  
Journal of Nematology  
Journal of Virology  
Molecular Phylogenetics and Evolution  
Nucleic Acids Research  
Phytopathology  
Plant Disease  
Plant Journal  
Virology

## **School of Natural Resource Sciences**

Agricultural and Forest Meteorology  
American Midland Naturalist  
Analytica Chimica Acta  
Biogeochemistry  
Chemosphere  
Crop Protection  
Environmental Pollution  
Environmental Toxicology and Chemistry  
Global Biogeochemical Cycles  
Global Change Biology  
International Journal of Biometeorology  
Journal of Atmospheric and Oceanic Technology  
Journal of Economic Entomology  
Journal of Environmental Quality  
Journal of Geophysical Research  
Pesticide Biochemistry and Physiology  
Remote Sensing Review  
Soil Biology and Biochemistry  
Soil Science

Technology: Journal of The Franklin Institute  
Weed Science

## **Veterinary and Biomedical Sciences**

Animal Reproduction Science  
Archives of Virology  
Australian Veterinary Journal  
Avian Diseases  
FEMS Microbiology Letters  
Infection and Immunity  
Journal of Clinical Microbiology  
Journal of General Virology  
Journal of Nutritional Biochemistry  
Journal of Veterinary Diagnostic Investigation  
Journal of Virology  
Large Animal Practice  
Veterinary Pathology  
Viral Immunology

## **Human Resources and Family Sciences Departments**

### **Family and Consumer Sciences**

Journal of Family and Consumer Sciences  
Journal of Consumer Education

### **Nutritional Science and Dietetics**

Journal of Agricultural and Food Chemistry  
Journal of the American Dietetic Association  
Journal of Chromatography  
Journal of Food Quality  
Journal of Nutritional Biochemistry

### **Textiles, Clothing and Design**

Journal of Applied Communications  
Journal of Small Business Management  
Starch/Starke  
Textile Chemist and Colorist

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## **Off-Campus Research Centers**

### **Northeast Research and Extension Center**

Crop Science  
Journal of Kansas Entomological Society  
Soil Science Society of American Journal  
Transactions of the American Society of Agricultural Engineers

### **Panhandle Research and Extension Center**

Crop Science  
International Food and Agribusiness Management Review  
Journal of Environmental Quality  
Journal of Natural Resources and Life Sciences Education  
Journal of Soil and Water Conservation  
Journal of Sugar Beet Research  
Large Animal Practice  
Plant Disease  
Rangelands  
Soil and Tillage Research  
Soil Science  
The Professional Animal Scientist  
Transactions of the American Society of Agricultural Engineers

### **South Central Research and Extension Center**

Geoderma  
Journal of Economic Entomology  
Journal of Production Agriculture  
Pesticide Biochemistry and Physiology  
Weed Science  
Weed Technology

### **West Central Research and Extension Center**

Geoderma  
Rangelands  
Weed Technology



# Research Publications (1998)

## Agricultural/ Natural Resources Units

## Agricultural Economics

### Journal Articles

Allen, J.C., B.B. Johnson, F.L. Leistrütz, D.A. Olsen, and R. Sell. 1998.

Telecommunications and rural business. *Economic Development Review* 15:53-59. (J. Series No.11479)

Atwood, J.A. and G.A. Helmers. 1998. Examining quantity and quality effects of restricting nitrogen applications to feedgrains. *American Journal of Agricultural Economics* 80:369-381. (J. Series No. 12045)

Azzam, A.M. 1998.

Captive supplies, market conduct, and the open-market price. *American Journal of Agricultural Economics* 80:76-83. (J. Series No. 12062)

Azzam, A.M. 1998.

Testing for vertical economies of scope: an example from U.S. pig production. *Journal of Agricultural Economics* 49:427-433. (J. Series No. 12459)

Azzam, A.M. 1998.

Competition in the U.S. meatpacking industry: is it history? *Agricultural Economics: An International Journal* 18:107-126. (J. Series No. 12318)

Fulginiti, L.E. and R.K. Perrin. 1998.

Agricultural productivity in developing countries. *Agricultural Economics: An International Journal* 19:45-51. (J. Series No. 11862)

Lynn, G.D. and C.F. Casey. 1998.

Regulation of technology adoption when individuals pursue multiple utility. *Journal of Socio-Economics* 27:701-719. (J. Series No. 11990)

Ortmann, J., J.L. Stubbendieck, R.A. Masters, G.H. Pfeiffer, and T.B. Bragg. 1998.

Efficacy and costs of controlling eastern redcedar. *Journal of Range Management* 51:158-163. (J. Series No. 11707)

### Book

Royer, J.S. and R.T. Rogers (eds.). 1998.

The industrialization of agriculture: vertical coordination in the U.S. food system. Ashgate Publishing, Aldershot, England.

### Book Chapter

Royer, J.S. 1998.

Market structure, vertical integration, and contract coordination, p. 73-98. *In: J.S. Royer and R.T. Rogers (eds.), The Industrialization of Agriculture: Vertical Coordination in the U.S. Food System.* Ashgate Publishing, Aldershot, England.

### Refereed Proceedings

Helmers, G.A. and J.A. Atwood. 1998.

Endogenizing durable asset ownership costs in linear programming models, p. 33-35. *In: H. Baker and N. Hall (eds.), Proceedings South-east Decision Sciences Institute.*

McBride, T.D., A.F. Coburn, S. Cordes, R. Crittenden, C.W. Fluharty, J.P. Hart, K.J. Mueller, and W.W. Myers. 1998.

The impact of Medicare capitation payment reform: A simulation analysis, p. 65-83. *In: The Ninth Federal Forecasters Conference, U.S. Department of Education, National Center for Education Statistics, Government Printing Office, Washington, DC.*

### M.S. Theses

Dong A. 1998.

Testing the collusion vs efficiency hypothesis in oligopoly/oligopsony model. (A.M. Azzam, Advisor)

Hunter, W.V. III. 1998.

Stimulating alternative irrigation systems and strategies for profitability comparisons. (R.J. Supalla, Advisor)

Skinner, C. 1998.

Vertical economies and the efficient structure of alternative vertical structures in hog production: An econometric analysis. (A.M. Azzam, Advisor).

### Ph.D. Dissertations

Ahmed, M.Z. 1998.

Measurement of agricultural technical efficiencies and impact of environmental regulations: A data envelopment analysis approach. (G.A. Helmers, Advisor)

Shaik, S. 1998.

Environmentally adjusted productivity (EAP) measures for Nebraska agriculture sector. (R.K. Perrin, Advisor)

Sukharomana, R. 1998.

Willingness-to-pay for water quality improvement: Differences between contingent valuation and averting expenditure methods. (R.J. Supalla and W. Miller, Advisors)

Wade, M.A. 1998.

The economic impacts of informational bias on consumer pork demand. (D.M. Conley, Advisor)

Yeboah, O.A. 1998.

Economic cost of augmenting streamflows in the Republican River in Southwest Nebraska. (M.E. Baker and R.J. Supalla, Advisors)

## Agricultural Leadership, Education and Communication

### Journal Article

Barbuto, J. and R. Scholl. 1998.

Development of new scales to measure an integrative taxonomy of motivation sources. *Psychological Reports* 82:1011-1022. (J. Series No.12159)

### Research Bulletins

Schauer, J., S.K. Rockwell, S. Fritz, and D. Marx. 1998.

Incentives and obstacles influencing faculty and administrators to teach via distance. *Research Bulletin* 331. University of Nebraska Agricultural Research Division.

Schauer, J., S.K. Rockwell, S. Fritz, and D. Marx. 1998.

Education, assistance, and support needed for distance delivery: faculty and administrator's perceptions. *Research Bulletin* 332. University of Nebraska Agricultural Research Division.

### Book

Silag, B., A. Schultz, P. Bishop, D. Dale, and J. King. 1998.

Visions of change in higher education. W.K. Kellogg Foundation, Battle Creek, MI.

### Book Chapter

King, J. 1998.

Scenario planning: powerful tools for thinking about alternatives, p. 3-17. *In: J. Giescke (ed.), Scenario Planning for Libraries.* American Library Association, Chicago, IL.

## Agronomy

### Journal Articles

Anderson, D.D., S.J. Nissen,

A.R. Martin, and F.W. Roeth. 1998.

Mechanism of primisulfuron resistance in a shattercane (*Sorghum bicolor*) biotype. *Weed Science* 46:158-162. (J. Series No. 11912)

Anderson, D.D., F.W. Roeth, and A.R. Martin. 1998.

Discovery of a primisulfuron-resistant shattercane (*Sorghum bicolor*) biotype. *Weed Technology* 12:74-77. (J. Series No. 11807)

Aslan, M., J.H. Skopp, and W.L. Powers. 1998.

Modified proportional model for time-dependent sieving. *Soil Science* 163:472-481. (J. Series No. 11936)

Baenziger, P.S., B. MorenoSevilla,

C.J. Peterson, D.R. Shelton, D.D. Baltensperger, S.D. Haley, L.A. Nelson, D.V. McVey, J.E. Watkins, J.H. Hatchett, and J.W. Schmidt. 1998. Registration of 'Windstar' wheat. *Crop Science* 38:894-895. (J. Series No. 11881)

Brejda, J.J., L.F. Moser, and K.P. Vogel. 1998.

Evaluation of switchgrass rhizosphere microflora for enhancing seedling yield and nutrient uptake. *Agronomy Journal* 90:753-758. (J. Series No. 11919)

Buah, S.S.J., J.W. Maranville,

A. Traore, and P.J. Bramel-Cox. 1998. Response of nitrogen use efficient sorghums to nitrogen fertilizer. *Journal of Plant Nutrition* 21:2303-2318. (J. Series No. 11689)

- Caha, C.A., D.J. Lee, and J.L. Stubbendieck. 1998. Organellar genetic diversity in *Penstemon haydenii* (Scrophulariaceae): An endangered plant species. *American Journal of Botany* 85:1704-1709. (J. Series No. 12054)
- Chung, J., J.H. Lee, K. Arumuganathan, G.L. Graef, and J.E. Specht. 1998. Relationships between nuclear DNA content and seed and leaf size in soybean. *Theoretical Applied Genetics* 96:1064-1068. (J. Series No. 11863)
- Chung, J., P.E. Staswick, G.L. Graef, D.S. Wysong, and J.E. Specht. 1998. Inheritance of a disease lesion mimic mutant in soybean. *Journal of Heredity* 89:363-365. (J. Series No. 11860)
- Cuomo, G.J., B.E. Anderson, and L.J. Young. 1998. Harvest frequency and burning effects on vigor of native grasses. *Journal of Range Management* 51:32-36. (J. Series No. 10586)
- Doran, J.W., E.T. Elliott, and K. Paustian. 1998. Soil microbial activity, nitrogen cycling, and long-term changes in organic carbon pools as related to fallow tillage management. *Soil Tillage Research* 49:3-18. (J. Series No. 12025)
- Eghball, B., G.W. Hergert, G.W. Lesoing, and R.B. Ferguson. 1998. Fractal analysis of spatial and temporal variability. *Geoderma* 88:349-362. (J. Series No. 12112)
- Gilley, J.E. and J.W. Doran. 1998. Soil erosion potential of former conservation reserve program sites. *Transactions of the American Society of Agricultural Engineers* 41:97-103. (J. Series No. 11858)
- Gilley, J.E. and B. Eghball. 1998. Runoff and erosion following field application of beef cattle feedlot manure and compost. *Transactions of the American Society of Agricultural Engineers* 41:1289-1294. (J. Series No. 11837)
- Graybosch, R.A. 1998. Waxy wheats: Origin, properties and prospects. *Trends in Food Science and Technology* 9:135-142. (J. Series No. 12125)
- Graybosch, R.A., C.J. Peterson, L.E. Hansen, S. Rahman, A. Hill, and J.H. Skerrett. 1998. Identification and characterization of U.S. wheats carrying null alleles at the *wx* loci. *Cereal Chemistry* 75:162-165. (J. Series No. 11886)
- Haile, F.J., L.G. Higley, and J.E. Specht. 1998. Soybean cultivars and insect defoliation: Yield loss and economic injury levels. *Agronomy Journal* 90:344-352. (J. Series No. 11903)
- Haile, F.J., L.G. Higley, J.E. Specht, and S.M. Spomer. 1998. The role of leaf morphology in soybean tolerance to defoliation. *Agronomy Journal* 90:353-362. (J. Series No. 11904)
- Harrell, D.M., W.W. Wilhelm, and G.S. McMaster. 1998. SCALES 2.0: Expanded computer program converting among development stage scales for corn and small grains. *Agronomy Journal* 90:235-238. (J. Series No. 11986)
- Hendrickson, J.H., L.E. Moser, S.S. Waller, and K.J. Moore. 1998. Phenological development of two warm-season grasses in the Nebraska Sandhills. *Journal of Range Management* 51:456-462. (J. Series No. 11716)
- Jayachandran, K., N.B. Stolpe, T.B. Moorman, and P.J. Shea. 1998. Application of <sup>14</sup>C-most-probable-number technique to enumerate atrazine-degrading microorganisms in soil. *Soil Biology and Biochemistry* 30:523-529. (J. Series No. 11893)
- Jenks, B.M., F.W. Roeth, A.R. Martin, and D.L. McCallister. 1998. Influence of surface and subsurface soil properties on atrazine sorption and degradation. *Weed Science* 46:132-138. (J. Series No. 11895)
- Johnson, P.G., T.P. Riordan, and K. Arumuganathan. 1998. Chromosome number and nuclear DNA content of buffalograss clones and populations. *Crop Science* 38:478-482. (J. Series No. 7386)
- Kessavalou, A., J.W. Doran, A.R. Mosier, and R.A. Drijber. 1998. Greenhouse gas fluxes following tillage and wetting in a wheat-fallow cropping system. *Journal of Environmental Quality* 27:1105-1116. (J. Series No. 11879)
- Kessavalou, A., A.R. Mosier, J.W. Doran, R.A. Drijber, D.J. Lyon, and O. Heinemeyer. 1998. Fluxes of CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub> in grass sod and winter-wheat fallow tillage management. *Journal of Environmental Quality* 27:1094-1104. (J. Series No. 11811)
- Limon-Ortega, A., S.C. Mason, and A.R. Martin. 1998. Production practices improve grain sorghum and pearl millet competitiveness with weeds. *Agronomy Journal* 90:227-232. (J. Series No. 11814)
- Lindquist, J.L., J.A. Dieleman, D.A. Mortensen, G.A. Johnson, and D.Y. Pester-Wyse. 1998. Economic importance of managing spatially heterogeneous weed populations. *Weed Technology* 12:7-13. (J. Series No. 12020)
- Lindquist, J.L. and D.A. Mortensen. 1998. Tolerance and velvetleaf (*Abutilon theophrasti*) suppressive ability of two old and two modern corn (*Zea mays*) hybrids. *Weed Science* 46:569-574. (J. Series No. 12019)
- Lindquist, J.L., D.A. Mortensen, and B.E. Johnson. 1998. Mechanisms of corn tolerance and velvetleaf suppressive ability. *Agronomy Journal* 90:787-792. (J. Series No. 12034)
- Lu, K., S.M. Kaeppeler, K.P. Vogel, K. Arumuganathan, and D.J. Lee. 1998. Nuclear DNA content and chromosome numbers of switchgrass. *Great Plains Research* 8:269-280. (J. Series No. 11466)
- Martinez-Reyna, J.M. and K.P. Vogel. 1998. Controlled hybridization technique for switchgrass. *Crop Science* 38:876-878. (J. Series No. 11964)
- Masi, C.E.A. and J.W. Maranville. 1998. Evaluation of sorghum root branching using fractals. *Journal of Agricultural Science* 131:259-265. (J. Series No. 11674)
- Masters, R.A., D.D. Beran, and F. Rivas-Pantoja. 1998. Leafy spurge (*Euphorbia esula* L.) response to AC 263,222. *Weed Technology* 12:602-609. (J. Series No. 12298)
- Masters, R.A. and S.J. Nissen. 1998. Revegetating leafy spurge (*Euphorbia esula* L.)-infested grasslands with native tallgrasses. *Weed Technology* 12:381-390. (J. Series No. 12082)
- Meyer, C.E., T. Mehta, M.F. Kocher, D.A. Mortensen, and A. Samal. 1998. Textural imaging and discriminant analysis for distinguishing weeds for spot spraying. *Transactions of the American Society of Agricultural Engineers* 41:1189-1197. (J. Series No. 11355)
- Mielke, L.N., and W.W. Wilhelm. 1998. Long-term tillage comparisons for winter wheat-fallow in the U.S. Central Great Plains: Soil physical characteristics. *Soil Tillage Research* 49:29-35. (J. Series No. 12151)
- Mitchell, R.B., L.E. Moser, K.J. Moore, and D.D. Redfearn. 1998. Tiller demographics and leaf area index of four perennial grasses. *Agronomy Journal* 90:47-53. (J. Series No. 11549)
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- Obaidi, M., B.E. Johnson, L.D. Van Vleck, S.D. Kachman, and O.S. Smith. 1998. Family per se response to selfing and selection in maize based on test-cross performance: A simulation study. *Crop Science* 38:367-371. (J. Series No. 11503)
- Ortmann, J., W.H. Schacht, J. Stubbendieck, and D.R. Brink. 1998. The "Foliage is the fruit" hypothesis: Complex adaptations in buffalograss (*Buchloe dactyloides*). *American Midland Naturalist* 140:252-263. (J. Series No. 11915)
- Ortmann, J., J. Stubbendieck, R.A. Masters, C.H. Pfeiffer, and T.B. Bragg. 1998. Efficacy and costs of controlling eastern redcedar. *Journal of Range Management* 51:158-163. (J. Series No. 11707)
- Park, W.J., J.W. Rhim, D.R. Shelton, S. Sahlinstrom, and W.B. Koh. 1998. Influence of temperature on the color change of Noodle Dough Sheet. *Food Science and Biotechnology* 7:276-281. (J. Series No. 11971)
- Pedersen, J.F. and J.J. Toy. 1998. Registration of A3N242 and A3N243 sudangrass. *Crop Science* 38:555. (J. Series No. 11897)

- Pedersen, J.F., J.J. Toy, and B. Johnson. 1998. Natural outcrossing of sorghum and sudangrass in the Central Great Plains. *Crop Science* 38:937-939. (J. Series No. 11899)
- Pérez, C.J., S.S. Waller, L.E. Moser, J.L. Stubbendieck, and A.A. Steuter. 1998. Seedbank characteristics of a Nebraska Sandhills prairie. *Journal of Range Management* 51:55-62. (J. Series No. 10674)
- Schacht, W.H., A.J. Smart, B.E. Anderson, L.E. Moser, and R.J. Rasby. 1998. Growth responses of warm-season tallgrasses to dormant-season management. *Journal of Range Management* 51:442-446. (J. Series No. 11868)
- Settimi, J.R. and J.W. Maranville. 1998. Carbon dioxide assimilation efficiency of maize leaves under nitrogen stress at different stages of plant development. *Communication of Soil Science and Plant Analysis* 7&8:777-792. (J. Series No. 11957)
- Smart, A.J., W.H. Schacht, J.F. Pedersen, D.J. Undersander, and L.E. Moser. 1998. Prediction of leaf: stem ratio in grasses using near infrared reflectance spectroscopy. *Journal of Range Management* 51:447-449. (J. Series No. 11742)
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- Thompson, W.M., S.J. Nissen, and R.A. Masters. 1998. AC 263,222 absorption and fate in leafy spurge (*Euphorbia esula*). *Weed Science* 46:510-513. (J. Series No. 12300)
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- Vogel, K.P. and K.J. Moore. 1998. Forage yield and quality of tall wheatgrasses in the USDA germplasm collection. *Crop Science* 38:509-512. (J. Series No. 11852)
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- Wilhelm, W.W. 1998. Long-term tillage comparisons for winter wheat-fallow in the U.S. Central Great Plains: Roots, leaf area, and dry matter partitioning. *Soil Tillage Research* 49:49-56. (J. Series No. 12031)
- Williams II, M.M., D.A. Mortensen, and J.W. Doran. 1998. Assessment of weed and crop fitness in cover crop residues for integrated weed management. *Weed Science* 46:595-603. (J. Series No. 12028)
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- Yamoah, C.F., C.A. Francis, C.E. Varvel, and W.J. Waltman. 1998. Weather and management impact on crop yield variability in rotations. *Journal of Production Agriculture* 11:219-225. (J. Series No. 11822)
- Yamoah, C.F., G.E. Varvel, W.J. Waltman, and C.A. Francis. 1998. Long-term nitrogen use and nitrogen-removal index in continuous crops and rotations. *Field Crops Research* 57:15-27. (J. Series No. 11853)
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Bridger, S.M. 1998.

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Influence of dietary cholesterol on hepatic sterol metabolism in hamsters. (T.P. Carr, Advisor)

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Assessment of omega-3 fatty acid intake in women of child bearing age from different income and education levels. (N.M. Lewis, Advisor)

Jarecke, J.N. 1998.

Development of a decision case for nutrition education. (T.P. Carr, Advisor)

Krumbach, C.J. 1998.

Vitamin and mineral supplement use among college athletes. (J.A. Driskell, Advisor)

Lee, J.Y. 1998.

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Mitmesser, S.H. 1998.

Carotenoid and tocopherol status of men and women of different ages. (J.A. Driskell, Advisor)

Schneider, C.S. 1998.

Influence of dietary cholesterol on hepatic sterol metabolism in hamsters. (T.P. Carr, Advisor)

Toledo, K.E.B. 1998.

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Witherby, K.L. 1998.

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## Textiles, Clothing and Design

### Journal Articles

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## Off-Campus Research Centers

## Northeast Research and Extension Center

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- Zerkoune, M.A., C.A. Shapiro, and L. Post. 1998.  
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### Books

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## M.S. Thesis

- Langrud, M.  
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## Panhandle Research and Extension Center

### Journal Articles

- Adams, D.C., R.T. Clark, P.F. Reece, and J.D. Volesky. 1998.  
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- Fausti, S.W., D.M. Feuz, and J.J. Wagner. 1998.  
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- Peterson, G.A., A.D. Halvorson, J.L. Havlin, O.R. Jones, D.J. Lyon, and D.L. Tanaka. 1998.  
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- Wilson, R.G. 1998.  
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- Yonts, C.D. and J.A. Smith. 1998.  
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- Elliott, N.C., G.L. Hein, M.C. Carter, J.D. Burd, T.J. Holtzer, J.S. Armstrong, and D.A. Waits. 1998.  
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- Hein, G.L. 1998.  
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- Kettler, T.A. 1998.  
Soil quality as influenced by intermittent plowing in conservation tillage wheat-fallow systems. (D.J. Lyon and W.L. Powers, Advisors)
- Stebbing, J.A. 1998.  
Effect of row spacing and sugarbeet variety on sugarbeet and redroot pigweed (*Amaranthus retroflexus* L.) development. (R.G. Wilson and A.R. Martin, Advisors)

## South Central Research and Extension Center

### Journal Articles

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Anderson, D.D., F.W. Roeth, and A.R. Martin. 1998.

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Eghball, B., C.W. Hergert, G.W. Lesoing, and R.B. Ferguson. 1998.

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Fernandes, O.A., R.J. Wright, and Z B Mayo. 1998.

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Jenks, B.M., F.W. Roeth, A.R. Martin, and D.L. McCallister. 1998.

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Meinke, L.J., B.D. Siegfried, R.J. Wright, and L.D. Chandler. 1998.

Adult susceptibility of Nebraska western corn rootworm (Coleoptera: Chrysomelidae) populations to selected insecticides. *Journal of Economic Entomology* 91: 594-600. (J. Series No. 11981)

Miota, F., M.E. Scharf, M. Ono, P. Marcon, L.J. Meinke, R.J. Wright, L.D. Chandler and B.D. Siegfried. 1998.

Mechanisms of methyl and ethyl parathion resistance in the western corn rootworm (Coleoptera: Chrysomelidaw). *Pesticide Biochemistry and Physiology* 61:39-52. (J. Series No. 12094)

### M.S. Theses

Dogramaci, M. 1998.

Interaction of *Lysiphlebus testaceipes* (cresson) and greenbug (*Schizaphis graminum*) (rondani) on resistant and susceptible sorghums. (Z B Mayo and R.J. Wright, Advisors)

Lee, C.D. 1998.

Variations of ALS-inhibitor resistance in Nebraska shattercane [*Sorghum bicolor* (L.) Moench] populations. (A.R. Martin and F.W. Roeth, Advisors)

### Ph.D. Dissertation

Anderson, D.D. 1998.

Physiological and genetic attributes of an acetolactate synthase resistant shattercane [*Sorghum bicolor* (L.) Moench] biotype. University of Nebraska, Lincoln. (A.R. Martin and F.W. Roeth, Advisors)

## West Central Research and Extension Center

### Journal Articles

Adams, D.C., R.T. Clark, P.E. Reece, and J.D. Volesky. 1998.

Research and education for managing resources within the Nebraska Sandhills: The Gudmundsen Sandhills Laboratory. *Rangelands* 20:4-8. (J. Series No. 12142)

Eghball, B., G.W. Hergert, C.W. Lesoing, and R.B. Ferguson. 1998.

Fractal analysis of spatial and temporal variability. *Geoderma* 88:349-362. (J. Series No. 12112)

Snell, R.R., J.F. Keen, S. Bradley, and J.L. Johnson. 1998.

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Wicks, G.A., G.E. Hanson, W.L. Felton, R.D. Murison, and P. Nash. 1998.

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Pre- and post-calving copper supplementation of 2-year-old cows on calf health and immunity and cow reproduction. (G.H. Deutscher and D.R. Brink, Advisors)

Sandberg, R.E. 1998.

Efficacy of N-Alkanes as markers to predict forage digestibility. (D.C. Adams and T.J. Klopfenstein, Advisors)

# Research Expenditures

**A**RD receives funding from federal formula funds, industry grants, federal grants and state appropriations. During fiscal year 1998-1999, faculty with ARD appointments obtained grant and contract funds that totaled \$21,000,459. This amount represents 46.6 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, 1998 through June 30, 1999

### Federal Formula Funds:

Hatch Formula .....	\$2,267,698
Regional Research .....	\$ 787,531
McIntire-Stennis .....	\$ 163,756
Animal Health .....	\$ 130,521

Total Federal Formula Funds .....

	\$ 3,349,506
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**State Appropriated Funds** .....

	\$27,312,126
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**Nebraska Research Initiative Funds** .....

	\$ 2,928,147
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### Contracts and Grants:

USDA Cooperative Agreements .....	\$1,628,996
USDA Special and Competitive Grants ..	\$3,520,750
Federal Grants - (NSF, NIH, USEPA, AID, DOE) .....	\$5,095,928 <sup>1</sup>
Industry Grants .....	\$7,324,832

Total Grants and Contracts .....

	\$17,570,506
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**Product Sales** .....

	\$ 6,671,338
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**Total Expenditures** .....

	\$57,854,597
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<sup>1</sup>\$202,020 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 1999**

<i>Expenditure Category</i>	<i>State Appropriated &amp; Hatch Funds</i>	<i>Federal Grants</i>	<i>Industry Grants</i>	<i>Revolving Funds</i>	<i>All Funds</i>
	----- % of total within source -----				
<b>Salaries, Wages and Benefits</b>					
Faculty/Administrative	40.3	6.3	2.4	1.5	22.5
Managerial/Professional	12.9	5.8	6.8	5.5	9.7
Office/Service	11.9	5.0	9.6	17.3	10.8
Hourly Wages	0.8	3.1	6.9	4.8	2.7
GRA Stipends	5.6	14.0	19.0	1.7	9.0
Benefits	13.0	5.3	7.3	6.1	9.8
<b>Subtotal:</b>	84.5	39.5	52.0	36.9	64.5
<b>Operating</b>					
Supplies and Expenses	12.8	55.0	36.9	54.5	30.4
Travel	0.7	2.7	5.0	3.2	2.1
Equipment	2.0	2.8	6.1	5.4	3.0
<b>Subtotal:</b>	15.5	60.5	48.0	63.1	35.5
<b>Total:</b>	100.0	100.0	100.0	100.0	100.0

## Agricultural Research Division Selected Research Program Information

Category	FY 1997	FY 1998	FY 1999
<b>Project Information:</b>			
Projects at beginning of year	384	387	368
Projects terminating	44	57	23
Projects revised	7	11	11
New projects	47	38	54
Projects at the end of the year	387	368	399
<b>Faculty full-time equivalents (FTE)</b>	<b>126.3</b>	<b>130.8</b>	<b>129.9</b>
<b>Expenditures for budgeted research faculty:</b>			
Federal formula and state approp., \$/FTE <sup>1</sup>	\$242,581	\$239,650	\$258,582
Grant and contracts, \$/FTE	\$126,158	\$116,030	\$135,262
Product sales, \$/FTE	\$ 51,824	\$ 58,127	\$ 51,357
<b>Outputs from research programs<sup>2</sup>:</b>			
Refereed journal articles	280	289	274
Research bulletins	1	1	2
Books and book chapters	54	49	68
M.S. and Ph.D. theses	139	136	148
Cultivars and germplasm released	7	7	13
Patents obtained	5	5	3

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

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