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Agricultural Research Division 108th Annual Report 1994

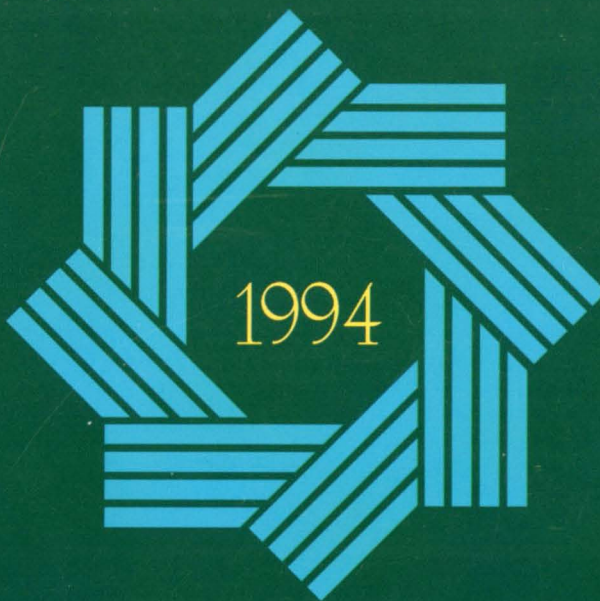
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108th
Annual Report
Agricultural Research Division



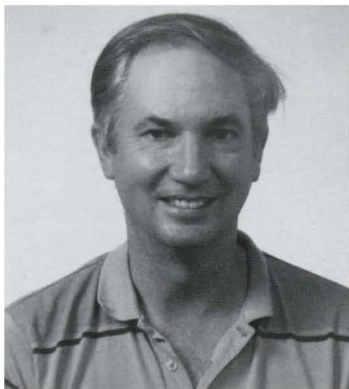
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
July 1, 1993 to June 30, 1994



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"The consumer is the ultimate beneficiary of all agricultural research. For producers, there is a short-run advantage gained by the early adopters of a successful new technology. But before long, the entire industry adopts the new technology. This reduces production costs, which in turn holds down costs to the consumer."

– George Pfeiffer
agricultural economist



"The most interesting thing about my job is finding something that nobody else ever knew before."

– Anne Vidaver
head
Plant Pathology
Department

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“My emphasis is on utilizing readily renewable resources we can produce in Nebraska.”

– **Milford Hanna**
director
Industrial Agricultural
Products Center



“I’m interested in the business of developing alternatives to pesticides that control insects. What I really want to see my career accomplish is a reduction of pesticide levels in the environment. This work is part of my vision as an environmentalist.”

– **David Stanley-Samuelson**
insect biochemist/
physiologist

Did You Know?

More than 70 percent of Nebraska's roughly 2.5 million wheat acres are planted to winter wheat varieties from IANR's joint wheat breeding program with USDA. This boosts Nebraska wheat growers' incomes by an estimated \$40 million annually.



IANR horticulturists have developed new turf-type buffalograsses that offer Nebraskans environmentally friendly, low-maintenance options for yards and parks. These improved turf-type buffalograss varieties need about half the water and fertilizer of other commonly grown Nebraska turfgrasses. They also require less mowing and pesticides.



NU's Food Processing Center taps the expertise of IANR food scientists to assist the state's growing food industry. In 1993 alone, the center conducted 190 short-term research projects for food processing companies, of which 126 were for 47 different Nebraska companies.



Farmers following research-based conservation tillage practices recommended by IANR reduce soil erosion by 50 percent annually.



"Our research emphasizes solving the real problems of Nebraska's people, communities and businesses."

**– Darrell W. Nelson
Agricultural
Research Division
dean and director**

It is a pleasure to provide the 108th Annual Report of the UNL Agricultural Research Division (ARD). This report contains lists of current faculty, visiting scientists and research associates; active research projects; refereed journal articles, books, and book chapters published; theses and dissertations written; germplasm/cultivars released; and awards received by faculty. Also included are brief descriptions of accomplishments from selected research projects and the financial report for the period July 1, 1993 to June 30, 1994.

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 mission of ARD is to conduct problem-solving and fundamental research that: (1) addresses priority issues facing Nebraska's agricultural and food industries, (2) provides a knowledge base essential for managing our natural resources that enhances the environment and ensures a sustainable base for food production, (3) promotes family well-being and community development, and (4) educates future scientists through hands-on experiences. ARD scientists continually seek to enhance Nebraska's agriculture, agribusiness, natural resources and environment, and quality of life.

Our program has an excellent balance of projects providing new information or technologies relevant to current agricultural, agribusiness, environmental, and family and community issues, and projects aimed at providing the knowledge base for solving future problems.

Faculty conducting research in agriculture, family sciences and natural resources in the Institute of Agriculture and Natural Resources (IANR) carry research appointments in ARD. Most faculty are on joint appointments with teaching responsibilities in the College of Agricultural Sciences and Natural Resources or the College of Human Resources and Family Sciences, or serve as Extension Specialists in the Cooperative Extension Division.

As of June 30, 1994, 132 full-time equivalents in the ARD were distributed over 260 faculty members. These faculty are located on the East Campus of the University of Nebraska-Lincoln and at District Research and Extension Centers at Clay Center, Concord, North Platte and Scottsbluff.

The Agricultural Research and Development Center near Mead serves as the primary site for Lincoln-based faculty conducting field research on crops, livestock, ornamental plants, trees and turfgrass.

All research activities are carried out as a part of one or more peer-reviewed, USDA-approved projects. There are currently 362 research projects supported by ARD resources.

Our research emphasizes solving the real problems of Nebraska's people, communities and businesses. Our faculty currently focus on increasing production efficiency, developing new uses of commodities for food and industrial purposes, ensuring a safe and nutritious food supply, developing production systems compatible with maintaining a quality environment and conserving natural resources, and enhancing rural communities and the quality of life for Nebraska families.

Results derived from various projects are published in scientific journals, trade magazines, bulletins, books, UNL publications and departmental reports. These research results then become the information base for classroom instruction and educational programs of the Cooperative Extension Division. Other products of research such as new plant varieties, computer programs, designs for agricultural equipment and biological control agents for pests are provided directly to clientele or to businesses serving our clientele.

Researchers in ARD are part of a national network of Agricultural Experiment Station scientists located at Land Grant Universities across the United States. ARD faculty are involved in approximately 65 regional projects in which they collaborate with researchers at other universities to address priority problems of regional importance. In addition, many cooperative efforts are under way with the USDA Agricultural Research Service and Forest Service employees stationed on East Campus and at the U.S. Meat Animal Research Center at Clay Center.

Readers of this annual report are encouraged to contact ARD with questions about our programs or input regarding research needs. Bettering Nebraska's agriculture, environment, economic well-being and quality of life is the ultimate goal for ARD research programs.

Darrell W. Nelson

Darrell W. Nelson, Dean and Director
Agricultural Research Division



The Agricultural Research Division's diverse research endeavors represent a scientific investment in Nebraska's future. Nebraskans have long enjoyed high returns on their agricultural research investments. Current efforts by ARD scientists in the Institute of Agriculture and Natural Resources promise to continue yielding solid dividends.

Whether it's better understanding the needs of youth and families or finding ways to protect Nebraska's natural resources, IANR scientists provide innovative scientific leadership for Nebraska.



New NU soybean variety paying off in farmers' fields

An NU-developed soybean variety designed especially for Nebraska's growing conditions debuted in many fields in 1994, the first year it was available for large-scale commercial production.

It's estimated that revenue from 95,000 acres planted to the new variety, Dunbar, in 1994 could be worth about \$20 million to Nebraska soybean producers. IANR soybean breeders developed Dunbar as a high-yielding variety with phytophthora root rot resistance. It was released in 1992 and seed was allocated to certified seed growers for increase.

The Nebraska Crop Improvement Association expects Dunbar eventually will be grown on about 10 percent of Nebraska's 2.5 million soybean acres. That 10 percent planting would be worth about \$3 million annually to certified seed growers who produce seed for farmers and \$55 million to Nebraska soybean producers.

Program targets sugar beet disease

Helping Nebraska's sugar beet growers cope with a dreaded newcomer is the aim of a collaborative Panhandle research effort.

Nebraska's first case of rhizomania, a viral disease, was found

in a Scotts Bluff County field in 1992. The disease infects tiny beet roots, restricts growth and reduces sugar yield. Once in soil the virus remains virtually forever, so farmers sought help to prevent its spread.

IANR launched a research program at NU's Panhandle Research and Extension Center with financial help from Western Sugar Co., its growers and the Nebraska legislature.

Researchers are attacking the problem on several fronts because little is known about rhizomania's potential impact on this Panhandle crop, grown on 81,900 acres and

valued at \$61 million in 1991.

In the lab, scientists test soil samples for the virus. In the field, they test defensive strategies such as resistant seed varieties and soil fumigants.

Possible management strategies and a clearer picture of the disease's potential impact in Nebraska should grow from this work.

Panel probes how health reform could affect rural residents

Policy-makers grappling with national health care reform can base their decisions on solid analysis of how their actions could affect rural areas.

A nationwide panel of experts, which an IANR agricultural economist organized and serves on, is helping supply this information. The panel's work helps increase awareness of rural health needs.

This panel assesses rural implications of health care reform and reports findings to Congress. This work aims to inform debate and

offer research-based information to help policy-makers better understand key rural issues.

Rural needs are easily overlooked amid complex health care debate, the panel said. The most critical rural health issue is an adequate supply of health care providers and facilities, panelists told Congress.

Panelists collaborate through the Rural Policy Research Institute. This consortium, established by NU and three other universities, analyzes rural implications of public policy issues and legislative decisions.

Ultimately, panelists hope this work helps policy-makers assure rural concerns are represented in final health care reform decisions.

Rural retailers to benefit from 12-state study

Comprehensive information on rural retailing emerging from a 12-state study should help researchers develop tools to aid rural merchants.

Textiles, clothing and design department researchers and colleagues in other states study rural



Mary Bargman Crawford

Plant Pathologist Eric Kerr tests soil samples for rhizomania by growing sugar beets in pots of the soil in a greenhouse at NU's Panhandle Research and Extension Center at Scottsbluff. He extracts juice from seedling roots for testing.

towns under 10,000 population. They're exploring ways to optimize the rural retail environment and rural communities' abilities to satisfy consumers.

NU College of Human Resources and Family Sciences researchers and graduate students surveyed consumers and merchants from several Nebraska towns for this project.

Researchers and NU Cooperative Extension specialists are using this information to develop training programs for extension educators who would then work with rural retailers.

Early reduced-rate herbicide/cultivation system cuts costs

A reduced-rate herbicide and cultivation combination produces full-strength broadleaf weed-fighting power that cuts costs and chemical use.

An IANR weed scientist developed the integrated system for broadleaf soybean weed control. It involves spraying herbicide at half the recommended rate about a week earlier than usual and following with cultivation two or three weeks later.

IANR research shows weed control and crop yields with this reduced-rate system equal conventional applications. The integrated system costs \$6 to \$7 per acre, half of conventional full-rate treatment. That's a \$1,200 to \$1,400 savings on 200 acres of soybeans.

Vigilant management, proper herbicide selection and timing are critical to half-rate spraying. However, there's a safety net. If producers can't spray early, they can fall back on conventional timing and full-rate treatment.

Researchers also are studying reduced-rate herbicide applications in corn and in no-till soybeans. It's part of IANR weed scientists ongoing efforts to effectively control weeds with less herbicide.



Mark Hansen

From this to this – each of the roughly one-inch refuse-derived fuel cubes on the right contains 10 grams of shredded waste paper or the equivalent of about 2.5 sheets of typing paper. Research is under way to see if the waste, which contains significant energy, can be turned into compact cubes that burn well and withstand handling, storage and shipping.

Energy in waste could fuel the future

Today's waste could be tomorrow's fuel.

An IANR bioprocessing engineer is exploring the best ways to combine unrecyclable waste paper and an ethanol processing byproduct to create compact, durable fuel cubes.

Raw material abounds.

Unrecyclable fibrous materials, mostly paper, comprise about 45 percent of the roughly 200 million tons of waste Americans generate annually.

This waste contains significant energy, but techniques must be found to make the material useable. Compact cubes that burn well and withstand handling, storage and shipping are essential to turning waste into fuel.

IANR researchers are working on ways to maximize the adhesive strength of a natural binder derived from ethanol distillation waste water. They're using it to bind the waste paper together.

They're exploring the best binder formulations and various combinations of time, heat and pressure to

yield the most economical, efficient, best-binding formula.

The work eventually could add value to two low-value byproducts, ease waste disposal headaches, and provide a new fuel resource.

Insect-fighting corn getting close look

Corn that grows its own natural insecticide is coming soon to Nebraska fields.

Private companies are developing and testing transgenic corn with the insect-fighting power of *Bacillus thuringiensis* (Bt) built into its genetic structure. Bt is a natural bacteria that produces a protein lethal to many caterpillars, including European corn borer, a multi-million dollar corn pest.

Genetically engineered hybrids that produce the Bt protein as they grow will be available in the next few years. An IANR entomology team is learning all it can about Bt-enhanced corn's effectiveness and implications to provide Nebraska growers with scientifically sound information.

In the laboratory, researchers test Bt susceptibility of European corn borers collected from different sites. They want to know whether Bt susceptibility varies among corn borers from different locations. Ultimately, they want to establish baseline susceptibility data before the new corn hybrids become available. This information will help determine whether the pests are developing Bt resistance over time.

Entomologists also are field testing Bt corn in cooperation with private companies developing the new hybrids. They're exploring various aspects of its performance and environmental impact.

The field and laboratory tests should help answer many questions about this new generation of corn hybrids.

Health insurance can overwhelm those who are retired

Health insurance confuses many folks, especially retired people.

IANR researchers interviewed 150

retired Nebraskans to learn what sorts of education programs might help retired people better cope with the health insurance system. They also explored this group's satisfaction with their health insurance.

This NU College of Human Resources and Family Sciences study shows many retired people have limited knowledge about the system and find it overwhelming. The health insurance appeals process is particularly perplexing.

While some studies indicate people have an even chance of successfully appealing a Medicare decision, this survey showed few people ever try to appeal.

Asked whether they were satisfied with their health insurance coverage, many respondents indicated they had to be satisfied with what they had. Insurance costs or pre-existing health conditions limited their options.

Findings provide information about what types of insurance education retired people need and who could benefit most from such training.

Risks, problems face state's youth

A study of risks facing Nebraska adolescents provides a valuable resource for those who work with the state's young people.

An IANR family scientist surveyed 1,352 4-H members and rural high school students to gather baseline information on adolescents' perceptions, attitudes and behaviors related to physical and mental health issues.

This project, the first of its kind in Nebraska, indicates rural teens face many pressures, stresses, problems and risks. Sexual behavior, problematic activities at school, suicide attempts and low female self-esteem are among the most troubling, researchers say.

The survey highlights problems, but also shows many young people are doing well.



Shelterbelt Ecologist Jim Brandle stands in a cornfield sheltered on three sides by windbreaks. Researchers are studying whether shelterbelts can help protect crops if the climate warms.

Participating rural high schools received individualized reports of results so officials can focus on their students' specific needs. NU Cooperative Extension is using findings to develop programs targeting problems teens face.

Team explores shelterbelts' role if climate warms

Researchers exploring impacts of a potentially warmer future think shelterbelts could play an increasingly important crop protection role.

Atmospheric scientists predict average annual temperatures across the Great Plains could warm as much as 9 degrees F over the next 50 years. How land might be used most profitably under such a scenario is an important adaptation question.

An IANR climatologist and shelterbelt ecologist have teamed to provide some answers by exploring

whether shelterbelts could help protect crops if the climate warms. Using field data and computer models, they're simulating conditions for dryland corn growing behind shelter and in the open as average annual temperatures increase.

With no change in wind or rainfall, sheltered corn yields would match or exceed current unsheltered yields with average annual temperatures up to 5.4 degrees F higher than today, the model indicates. Unsheltered yields are below the baseline with any temperature increase and no change in rain or wind.

Both sheltered and unsheltered yields decline under the model's most severe climate scenarios, but sheltered yields are about 27 to 28 percent higher than unsheltered yields.

They're expanding the study to varied Great Plains' environments to

provide broader results that could aid decisions about how best to respond to global warming.

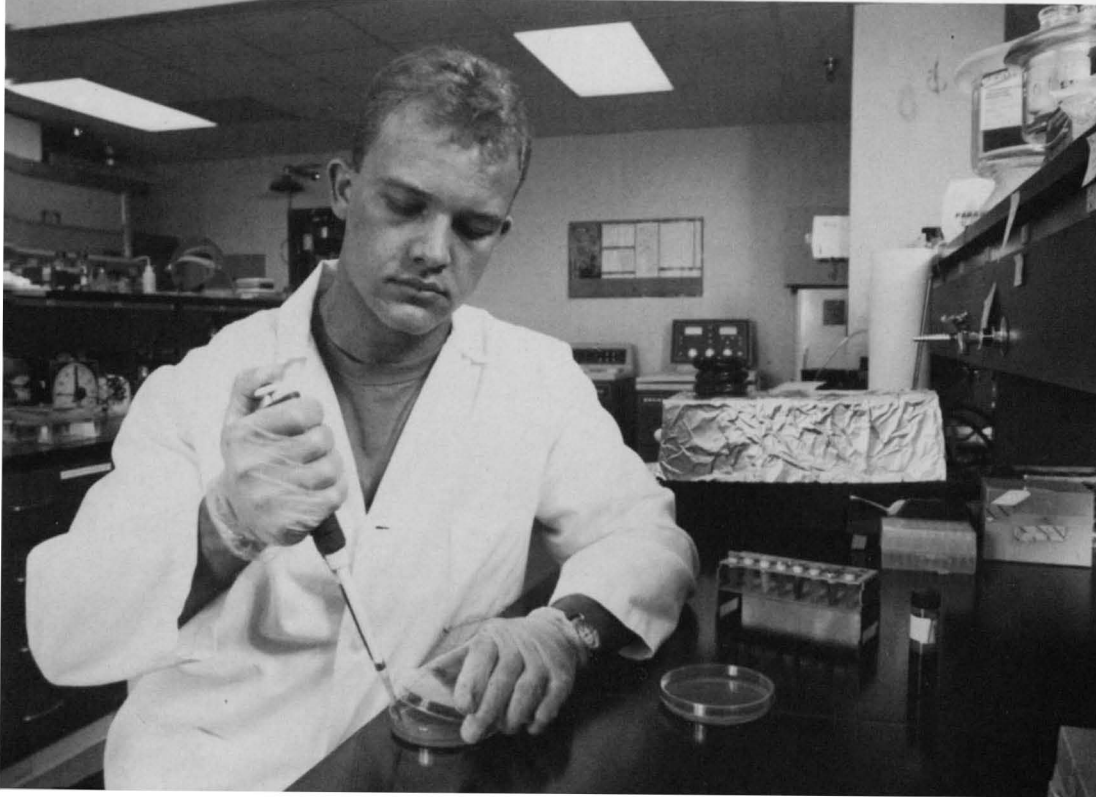
White wheat breeding could open markets

High quality wheat in a different colored package is the goal of a new cooperative NU and USDA-ARS hard white winter wheat breeding program.

A hard white winter wheat would open new markets to Nebraska growers. The domestic milling and baking industry uses white wheat for everything from bread to tortillas, and prefers white wheat for baking whole grain products. White wheat also could help growers compete more effectively on the huge Asian market, which demands white wheat for making noodles.

Breeding a new wheat is a long process, requiring eight to 10 years to

Mark Hansen



Graduate student Doug Christensen adds bacteriocins to a dish containing listeria, an organism that causes a sometimes-fatal food-borne illness. Many bacteria produce bacteriocins, substances that inhibit competing bacteria. NU food scientists discovered a new way to harness bacteriocins to protect foods from microbial hazards.

get a variety into production. But the hard white wheat project has a good base to build on.

NU's hard red winter wheat breeding program is a 60-year success story that has produced dozens of top Great Plains wheat varieties. Transferring superior traits from those wheats to a hard white winter wheat is the focus of the new breeding program.

Food-friendly bacteria helps protect foods

Harnessing a food-friendly bacteria's defenses, IANR food scientists have developed a new, natural way to keep foods safe and fresh.

NU has patented the technique, which essentially enlists good bacteria to fight spoilage and disease-causing organisms in non-fermented foods.

Many bacteria produce bacteriocins, substances that inhibit or kill competing bacteria. Some bacteria commonly used to ferment foods produce bacteriocins during fermentation that protect against spoilage and disease culprits.

IANR researchers discovered bacteriocin production can occur without fermentation. That means helpful bacteriocin-producing bacteria can be placed in raw and processed foods for greater anti-microbial protection.

This could especially benefit minimally processed foods that are particularly vulnerable to microbial hazards.

The food industry is interested in natural anti-microbial food protection techniques because of consumer interest in natural goods and public concern about food safety. The economic impact of microbial food hazards in the U.S. is estimated to be as much as \$5 billion annually.

Rural housing needs in research spotlight

Housing policies geared to Washington, Chicago, Dallas, or even Omaha and Lincoln sometimes are not well-suited to rural communities.

NU College of Human Resources and Family Sciences researchers are studying Nebraska towns of 1,000 to 2,500 people to identify the most pressing rural housing concerns. This is part of a two-state project that researchers hope helps policy-makers better understand and address specific rural housing needs.

Housing availability emerged as the priority in discussion groups researchers conducted in 12 rural Nebraska towns in 1993 and 1994. Affordability also is a concern, but it's often secondary because many small towns don't have enough of the right type of housing to meet demand.

The team is also examining

whether large, nationwide databases, such as U.S. Census information, accurately reflect rural needs. Researchers suspect small town housing concerns sometimes get lost amid such massive information, which often influences federal policy decisions.

The project will last several years, with findings shared with policy-makers.

Team is seeking ways to boost nitrogen efficiency

IANR researchers are exploring how to improve nitrogen use efficiency from land and sky.

Variable rate fertilizer application equipment that changes rates as it moves across fields is already available. An NU South Central Research and Extension Center soil scientist works with a biological systems engineer and a USDA soil scientist at NU to compare variable rate and conventional applications.

Improving nitrogen use efficiency in irrigated corn is the overall goal. They want to know if variable rate applications reduce nitrogen leaching into groundwater in furrow- and center pivot-irrigated corn.

Finding out requires tracking myriad test plots and details including soil characteristics, how much fertilizer is applied where, yields, and residual nitrate in water and soil.

Global Positioning System satellites and receivers help map yields across fields, track soil samples and guide variable rate fertilizer applications. Geographic information system computer programs match all these site-specific measurements with information on site conditions.

This information and groundwater monitoring eventually should yield a comprehensive picture of how different fertilizer strategies influence crop yield and nitrogen leaching.

Research examines effects an infant's death has on family

The death of a child is a wrenching loss. The entire family feels the repercussions, which often last for years.

When Sudden Infant Death Syndrome, stillbirth or miscarriage are the cause of death, a terrible silence often surrounds the grieving, whose sense of loss increases as they feel they cannot talk about it.

An NU College of Human Resources and Family Sciences family researcher's pioneering studies on how such deaths affect families have helped to break this silence. This work has yielded three books and a fourth, which deals with miscarriage, is being written.

The books, written in collaboration with graduate students and fellow scientists, grew from 19 years of research. Through questionnaires and interviews, more than 1,000 parents, siblings and grandparents told stories of how an infant's death affected their lives. The books share many of these stories.

The studies revealed important information about how families cope with these deaths, offering such insights as how marriages are strengthened or damaged, and the effects an infant's death has on siblings and grandparents.

Water quality is focus of project using swine waste

Swine producers sometimes irrigate crops with swine waste water to dispose of waste and fertilize crops.

However, there are no management guidelines to help farmers know how and how much to apply to keep nitrogen in the waste from contaminating groundwater.

Researchers at NU's Northeast Research and Extension Center near Concord and other IANR scientists are



Veterinary Scientist Clinton Jones taps a variety of biotechnology techniques to study latency in the Bovine Herpes Virus-1, which causes serious problems for cattle producers. Here he studies x-ray film showing patterns of DNA fragments from BHV-1's latency-related gene. His work someday may lead to developing anti-viral strategies for treating humans.

irrigating corn and alfalfa with swine waste water to find out.

They irrigate with varying amounts of lagoon water and test soil and water nitrate levels after treatments. They want to develop application rate guidelines that maximize water use and protect water quality.

Cattle virus research may help humans

An IANR veterinary scientist unraveling the genetics of a herpes virus that causes serious problems in the cattle industry hopes his research may someday help humans.

Bovine Herpes Virus 1 (BHV-1), a relative of herpes viruses that infect humans, enters a latent state once it infects an animal. In the latent state it causes no damage, waiting quietly to reactivate. It also is undetectable, making eradication of the disease difficult. BHV-1 causes conjunctivitis,

an eye disease, respiratory infections, miscarriage and, occasionally, encephalitis, a potentially lethal brain inflammation.

Research focuses on the virus' latency-related gene, which is thought to keep the virus in its latent state or cause it to reactivate. Understanding the complex workings of this gene may contribute to designing vaccines to prevent BHV-1 infection and treatments for animals already infected and even may lead to developing anti-viral strategies for treating humans.

Watery crops have potential for millions

Nebraskans don't usually think of fish as a crop, but watery crops of walleye, yellow perch and other fish have the potential to be a \$100 million a year industry for the state.

Aquaculture is the nation's fastest

growing agricultural area. It boasts one of the highest economic multipliers in agriculture, and most of that economic benefit comes locally because slaughtering and packaging usually is done near a fish farm.

An IANR aquaculture scientist is experimenting with new methods to solve practical fish production problems to enhance Nebraska's aquaculture industry.

Using pond fertilization and aeration, IANR researchers boosted walleye fingerling production by over 55 percent at the Nebraska Game and Parks Commission's North Platte fish hatchery.

Three years research shows traditional walleye stocking rates of 100,000 new-born fish per acre could be tripled with no significant decline in survival rate and only a slight size loss. More fish per acre mean more profit. Researchers are studying other ways to boost fish production profits, as well.

Poinsettia nutrition can affect appeal

Consumer appeal is the bottom line in poinsettia production. That's why IANR horticulturists invited consumers and grower-retailers to participate in their research on the plant.

Consumers and grower-retailers served as sensory panelists to evaluate poinsettias grown in a study of sulfur and nitrogen nutrition. They rated plants as exceptional quality, salable or not salable.

The sensory panel was part of research on how varying nitrogen and sulfur levels affect poinsettias. Finding optimal nutrient levels is increasingly important as fertilizers become more expensive.

Researchers found that poinsettias grown with supplemental sulfur needed less nitrogen. Reducing nitrogen use is important because nitrogen runoff that leaches into groundwater can be a serious problem.

Initial results show several sulfur and reduced nitrogen combinations produce exceptional quality plants. Researchers will formulate nutrient recommendations so growers in Nebraska and elsewhere can put their money-saving findings to work.

Biological controls tried in turf battles

Environmentally friendly weapons for the battle against turf diseases are the goal of an IANR plant pathologist.

Identifying helpful organisms and giving them a fighting chance against a disease-causing fungus is the basis for biological control research. If successful, biological controls will reduce the need for chemical pesticides.

The *Rhizoctonia* fungus, which causes destructive brown patches in turf, can be fought with its natural enemies, two other fungi. One organism competes for *Rhizoctonia*'s food, the other is thought to produce a fungicide-type compound right on the grass blade.



Mark Hansen

Graduate student Stacy Adams (left) and Horticulturist Ellen Paparozzi examine poinsettias that are part of research into sulfur and nitrogen nutrition for the plants. They found that poinsettias grown with supplemental sulfur need less nitrogen.



Mark Hansen

Loren Giesler (left), graduate research assistant, and Plant Pathologist Gary Yuen place plots of turfgrass in plastic bags after inoculating the turf with a biological control fungus. The biological control requires high humidity, which is common in natural turf in summer. The bags create a similar environment for research purposes. Successful biological controls could reduce the need for chemical pesticides.

For these organisms to be effective biological controls, their numbers must be drastically increased.

Researchers grow the disease-fighting fungi in the laboratory and apply them to turf. Once on the turf, they multiply and compete with the disease culprit.

The organisms have controlled the disease, but are not yet quite as effective as pesticides. Researchers are working on more efficient application methods to improve control.

Mark Hansen



Varied diet affects chickens and eggs

Chickens are healthier and may produce healthier eggs when fed a more varied diet, IANR research shows.

Hens fed rations containing up to 5 percent whole oats laid more eggs and their gizzards grew larger, a measure of improved digestive health. The oat diet also helped chickens withstand

heat stress better.

Research also found that adding flax seed to hens' diets not only causes hens to lay more eggs, but the eggs have a special component. Flax seed contains high amounts of omega-3 fatty acids, which are known to reduce the occurrence of blood clots and the attendant risk of cardiovascular disease.

One egg from hens on a flax diet in the IANR study contained enough omega-3 to meet human daily requirements established in Canada. The U.S. presently has no omega-3 daily requirement standard.

IANR dietary studies now are exploring whether people who eat eggs from flax-fed hens show a change in cholesterol level.

Mice may serve as cattle stand-ins

Successfully selecting for genetic traits in mice may be a way to determine whether similar research with cattle is worth the time and expense, an IANR animal scientist believes.

Mice, cattle and swine inherit certain traits, such as growth rates, similarly. Using mice, an animal scientist can conduct a much larger experiment in less time than possible with cattle. Mice require far less food, space and labor and quickly reproduce.

Mice are selected for heat production, a means of quantifying energy maintenance requirements, or the amount of energy needed to keep an animal going. Cattle use 70 percent of the energy from feed to meet maintenance requirements and show genetic differences in the amount of

feed they use to meet these requirements.

To create genetically different mice, mice were selected for heat production and classified in high, low and control groups. After nine generations, mice of the same weight differ 30 percent in heat production and as much as 15 percent in feed intake.

These results show heat production in mice is a moderately heritable trait, and may have implications for cattle breeding.

Scientists take aim at sorghum cells

Plant geneticists aiming a gene gun at sorghum cells are shooting for hybrids with improved disease and insect resistance.

Sorghum armed with genes borrowed from other species could save farmers money and reduce the need for pesticides.

The helium-powered gene gun shoots pellets coated with DNA, the material that carries genetic information, into cells. Once in the cell, pellets shed the DNA, which becomes part of the cell's genetic code.

It's one technique USDA agronomists at NU use in genetic transformation, a process to introduce borrowed DNA into sorghum cells. Transformation allows scientists to add traits to sorghum that can't be introduced using traditional plant breeding methods.

Release of transformed sorghum hybrids is likely to be at least five or more years in the future.

Poultry Scientist Sheila Scheideler has found that adding flax seed to chickens' rations increases the amount of omega-3 fatty acids in the hens' eggs. A dietary study now under way is exploring whether people who eat eggs from flax-fed hens experience a change in cholesterol level.

A few more glimpses at ARD research ...

IANR scientists seek innovative solutions and information to enhance Nebraska's economy, environment and quality of life. Here are a few more glimpses of their work:

- Two-year-old cows exposed to bulls across fences come into heat sooner after calving, which helps improve herd management, IANR animal scientists found. Their research indicates fenceline bull exposure offers a practical, low-cost way to reduce rebreeding and late calving problems in these young cows. The key is to begin bull exposure soon after calving and continue it until the breeding season starts.
- Farmers considering a shelterbelt investment can get information customized to their farming operation from a computer program developed by IANR researchers and a Canadian scientist. This economic model factors in a landowner's specific situation and many other variables. It calculates which areas of a field a windbreak will protect in a given year, and the economic payoff from a specific windbreak design in an individualized scenario.
- Bean leaf beetles eat far less than previously thought when they munch soybean seedlings and seldom merit pesticide treatment. IANR entomologists found the soybean pests eat two-thirds less during spring feeding than earlier research elsewhere indicated. Infestations seldom are severe enough to justify treatment, this research shows. This work is helping entomologists develop more accurate treatment guidelines.

- Research sometimes has unusual spinoffs. Such is the case for an IANR swine reproductive physiologist whose studies of boar sexual behavior led him to better swine breeding building designs. He didn't set out to design buildings, but applying what he learned from his research helped him solve some practical problems producers faced in getting swine to breed. His designs are now used by swine producers in the U.S. and other countries.

- IANR horticulturists are exploring ways to combine appealing landscapes with water-efficient and environmentally friendly management techniques. Nebraska Research Initiative funds through UNL's Water Center/Environmental Programs unit support these research and demonstration projects. They're providing information people can apply to beautify their yards with more efficient management techniques and plants that use less water and protect environmental quality.

- An alternative dairy ration developed by an IANR dairy scientist should help producers save money, stretch high quality forage and boost production. High quality hay, a major dairy ration component, sometimes is in short supply and expensive. Researchers found that replacing 75 percent of conventional high quality hay/corn silage with a combination of soybean hulls and lower quality chopped alfalfa works well. Cows eating the alternative ration actually outperformed those on the conventional diet.

- IANR food scientists' work could help corn refiners more accurately predict starch yield, an important product from wet-milled corn. Starch content in kernels before milling is a good indicator of wet-milling starch yield. Corn refiners need fast, accurate methods for predicting starch yield. Food scientists are experimenting with near-infrared spectroscopy to predict wet-milled starch yield from corn samples. This technique shines an invisible wavelength of light on or through an object. They correlate differences in light reflectance to starch yield characteristics.

- NU nutrition scientists are developing and testing an edible film that might help bring out the true-meat taste of convenience meals. They hope to reduce the warmed-over flavor of meat in frozen, refrigerated or shelf-stable meals. They're working with IANR food scientists and meat scientists on edible films made from natural ingredients that could be used to coat meat to preserve flavor. Consumers and the food industry both could benefit from this interdisciplinary effort.

- Tiny algae may provide clues to a big question – is the climate warming? Forestry, fisheries and wildlife scientists think diatoms, a widespread class of freshwater algae, could be biological indicators of global warming. They're determining the genetic makeup of specimens from lakes from Texas to Canada. They hope to repeat this research in 10 years. If genetic characteristics of algae previously found in warmer lakes then match those of algae found in traditionally colder lakes, it would offer scientific proof that regional and perhaps global warming is occurring.

- Most common tillage systems leave less crop residue cover on soil than generally thought. That's the bottom line of an after-planting residue cover study at NU's Northeast Research and Extension Center. An IANR biological systems engineer found that only 13 of the 69 different tillage combinations left at least 30 percent crop residue after planting. Only four no-till combinations and one blade-plow system left the 40 percent crop residue many soil conservation compliance plans require.

- Hardy German cockroaches are among the most repulsive and most difficult to control household pests in Nebraska. They quickly develop immunity to pesticides. An IANR graduate student has isolated an enzyme that helps the pests develop insecticide resistance. This finding should help scientists devise more effective control products. It's not a cure-all but a step in the right direction in a Water Center/Environmental Programs scientist's efforts to find better cockroach controls.

- Two new IANR-developed varieties released in 1994 span the small and large of the food-grade soybean world. One new variety, Mercury, has seeds about half normal size. Its seeds are used for natto, a Japanese fermented food product, or for sprouts. Saturn, with seeds about twice the size of conventional beans, can be used as a green vegetable, typically called edamame, or for tofu and other food products. Both new varieties are part of IANR soybean breeders ongoing efforts to breed specialty varieties that help Nebraska growers capture new markets.



Faculty Awards and Recognition

One measure of excellence in research 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 awards for their work in the past year.

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

ARD faculty members honored for their work during fiscal year 1993-1994 include:

Agronomy

David J. Andrews received the International Service in Crop Science Award from the Crop Science Society of America.

P. Stephen Baenziger was designated as the Eugene W. Price Distinguished Professor in Biotechnology at UNL.

Robert Graybosch received the Early Career Scientist of the Year Award from the USDA Agricultural Research Service.

Stanley D. Jensen (Adjunct Professor) received the Agromomic Industry Award and the NCCPB Genetics and Agronomy Society Plant Breeding Award for Industry.

Alice J. Jones received a Fellow Award from the Soil and Water Conservation Society.

Kenneth Moore received the Crop Science Society of America Young Crop Scientist Award.

Scott J. Nissen received the ARD Junior Faculty Recognition for Excellence in Research Award.

James Schepers received the Agronomic Achievement-Soils Award from the American Society of Agronomy.

Dale Swartzendruber received the Editors' Citation for Excellence from the SCSA (Soil Conservation Society of America).

Animal Science

Mohammad Koohmaraie received the Distinguished Research Award from the American Meat Science Association.

Thomas W. Sullivan received the Service Recognition Award

from the Nebraska Poultry Industries.

Jong-Tsend Yen received the American Feed Industry Association Nutrition Research Award.

Biochemistry

Ruma Banerjee received the Basil O'Connor Starter Scholar Award from the March of Dimes Birth Defects Foundation.

Entomology

Brett Ratcliffe received the Outstanding Paper of the Year Award from the Coleopterists Society.

Blair D. Siegfried received the ARD Junior Faculty Recognition for Excellence in Research Award.

Horticulture

D.P. Coyne received the End Hunger Award from the U.S. Mayors for dry bean breeding in Nebraska and the Dominican Republic.

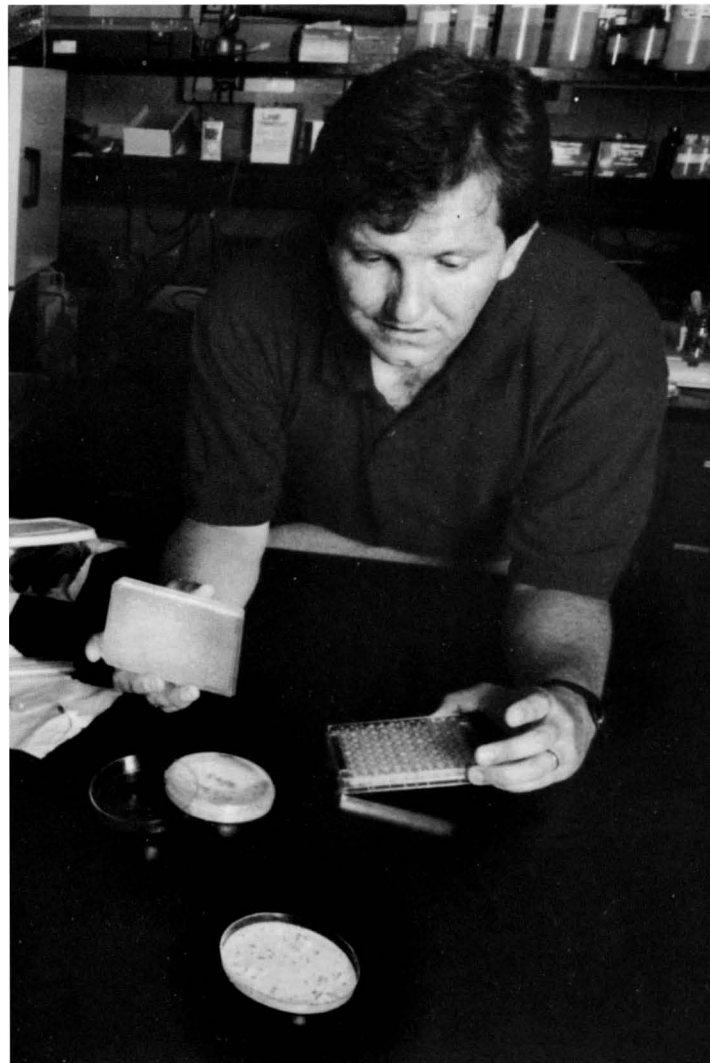
W.A. Gustafson was designated as an Honorary Professor of Jilin Forestry College, China.

T.P. Riordan received the President's Award from the Nebraska Turfgrass Foundation.

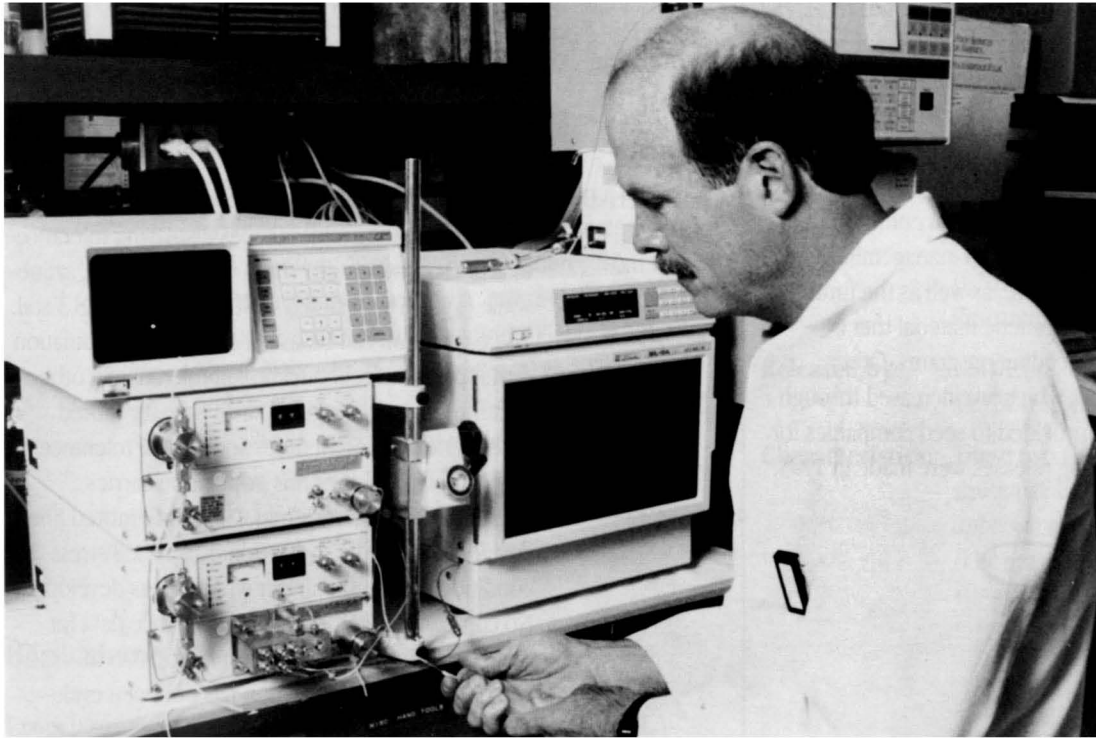
Veterinary and Biomedical Sciences

Gary Rupp received the Award of Excellence from the American Association of Bovine Practitioners/American Cyanamid.

Eva Wallner-Pendleton received the Service Award from the North Central Avian Disease Conference.



Insect Toxicologist Blair Siegfried inspects a dish containing tiny European corn borer larvae. European corn borers are a major Midwestern corn pest, and Siegfried is part of an IANR team studying implications of a corn borer control genetically engineered into corn. Siegfried received a Junior Faculty Recognition for Excellence in Research Award from NU's Agricultural Research Division.



Agronomist Scott Nissen uses a High Performance Liquid Chromatograph to study the metabolism of herbicides in leafy spurge, one of the worst grassland weeds currently infesting 5 million acres in the northern and central Great Plains. Nissen received a Junior Faculty Recognition for Excellence in Research Award from NU's Agricultural Research Division.

Nutritional Science and Dietetics

Judy Driskell received the Professional Scientist Award from the Food Science and Human Nutrition Section, Southern Association of Agricultural Scientists.

Textiles, Clothing and Design

Patricia Cox Crews received the Frost Prize for Distinguished Scholarship in American Crafts.

Joan Laughlin received the Award of Merit for Research from the United States Department of Agriculture.

Northeast Research and Extension Center

W.L. Kranz was named the Ag Engineering ASAE Soil and Water Division Outstanding Reviewer.

Panhandle Research and Extension Center

Robert G. Wilson was named an Honorary Member in the North Central Weed Science Society.

West Central Research and Extension Center

Paul T. Nordquist received a Special Award in Recognition of Contributions in Agriculture from the Nebraska Crop Improvement Association.

Water Center/Environmental Programs

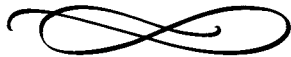
Shripat T. Kamble received the 1993-94 Recognition Award in Urban Entomology from the North Central Branch of the Entomological Society of America.



Variety and Germplasm Releases

ARD faculty involved in plant breeding and genetics research make important contributions to the improvement and development of agricultural and horticultural crops. Public breeding programs such as ARD's are essential to the continued enhancement of plant germplasm. These programs provide the resources and flexibility to pursue long-term breeding programs in crops that may not have a current commercial interest. They also can address genetic, cultural, and management interactions characteristics of today's agriculture, as well as the future.

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 1993.



Agronomy

Crop: Dent Corn (*Zea mays* L.)

Germplasm release: N204 and N207

Scientists: W.A. Compton, D. Galusha, and W.C. Youngquist

Characteristics: N204 was derived by selfing from NBS2(4) and N207 was derived by selfing from NS(B)RF3(5). N204 is slightly shorter than N203 and N205. It has a larger tassel that produces abundant pollen over a long shedding period. It is a medium green with salmon anthers, and flowers at about 1450 heat units in Nebraska. N204 has yielded extremely well when grown in hybrids in Nebraska. N207 is a medium tall line with medium-sized ears with a nice yellow color. The ears are relatively low set and girthy but the line does not yield heavily. In hybrids, the line has yielded well throughout the Corn Belt. N207 is the first line selfed directly from the Stiff Stalk Synthetic released by Nebraska for some years. It also flowers at about 1450 heat units. Both N204 and N207 are released as sources of high yielding germplasm.

Crop: Corn (*Zea mays* L.)

Germplasm release: Random Mating Population N-pH-P

Scientists: P. Nordquist, W.A. Compton, and B. Skates

Characteristics: This population was developed by five generations of random mating of genotypes displaying tolerance to alkali soils when grown on Cozad silt loam, saline-sodic (Typic Haplustolls) with average pH of 8.3 soil. The population can be used as a base for population development of saline-sodic soil tolerance in other locations as well as a germplasm base for inbred parent line development for sodic-alkali tolerance. It is not known whether this population carries tolerance combinations that will permit inbred line development under the extreme alkali soil stress conditions of the site under which it was developed. No comparative agronomic performance data for this population against the best hybrids on this site are available. This population has not been evaluated for any disease or insect sensitivities.

Crop: Corn (*Zea mays* L.)

Germplasm release: N-pH-G 92-1 to 92-608

Scientists: P. Nordquist, W.A. Compton, and B. Skates

Characteristics: These germplasms were developed by intercrossing and then inbreeding corn genotypes that displayed recovery from alkali soil induced iron deficiency chlorosis. The germplasms have a relatively wide range of maturities from 10 days earlier to two to three days later than MO17 and B73. Some of the germplasms carry purple plant pigmentation, but most are normal color. There is a substantial range in seed, cob, and tassel color and in grain hardness, with phenotypes ranging from dent to flint. None of the germplasms have been evaluated for any disease or insect sensitivities. Preliminary yield trials with several of the germplasms indicate good potential for use on alkali soils, however, none of the germplasms have been sufficiently tested to make firm recommendations.

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

Germplasm release: NPM-3

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

Characteristics: A dwarf grain pearl millet, NPM-3, restores male-fertility on the A4 cytoplasmic-nuclear male-sterile (CMS) system. NPM-3 provides a source from which dwarf lines can be derived to utilize the A4 CMS system to produce fertile hybrids. Plants in NPM-3 at Mead, Nebraska, grow between 80 and 120 cm tall and flower in 62 to 72 days from planting compared to KS2068A at 95 cm and 63 days to flower. Grain color is gray and weight ranges from 0.8 to 1.2 g/100. NPM-3 has not been evaluated for pest or disease resistance.

Horticulture

Crop: White Dry Edible Beans (*Phaseolus vulgaris* L.)

Germplasm release: Anacaona

Scientists: J.R. Beaver (University of Puerto Rico), E. Arnaud (Arroyo Loro Experiment Station, Dominican Republic), and D.P. Coyne (University of Nebraska-Lincoln)

Released by: Ministry of Agriculture, Dominican Republic (released in the D.R.), the University of Puerto Rico, and the University of Nebraska

Characteristics: The variety is a white seeded high yielding upright (Type II) compact bush bean with good field resistance to rust, web blight, and to white fly (vector of BGM virus). Anacaona has small leaves, flowers in 35-40 days and matures in 85-90 days.

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

Germplasm release: BelMiNeb-RR-1
BelMiNeb-RR-2

Scientists: J.R. Stavelly (USDA), M.J. Siberwagel (USDA), J.R. Steadman (UNL Plant Pathology), D.P. Coyne, (UNL Horticulture) and D.T. Lindgren (West Central Research and Extension Center)

Released by: USDA-ARS, Nebraska Agricultural Experiment Station and Michigan Agricultural Experiment Station

Characteristics: These two Great Northern breeding lines possess resistance to rust (Ur2 gene) (*Uromyces appendiculatus*) and bean common mosaic virus (I bc genes) and are adapted to western Nebraska.

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 or specialized processes. These patents often are licensed by private industry, with royalties being reinvested in future ARD research. The following patents were awarded in 1993.



Animal Science

Title: Method of making and using a ruminant feed

Number: 88 730067.1 (European Patent)

Scientists: T. J. Klopfenstein, L. Satterlee, R.A. Britton, and R.M. Cleale

Description: A novel method of treating soybean [*Glycine max* (L.) Merr] meal to increase protein bypass for ruminants was discovered. Soybean meal is mixed with xylose or sulfite liquor (a commercial source of xylose and byproduct of wood pulping) and heated to produce non-enzymatic browning. The resulting product has 2 1/2 times the bypass protein of untreated soybean meal.

Food Science and Technology

Title: Composition and method for inhibiting pathogens and spoilage organisms in foods

Number: 5,186,962 (U.S. Patent)

Scientists: R.W. Hutkins, E.B. Berry, and M.B. Liewen

Description: The method involves adding defined species of food-grade lactic acid bacteria to food mixtures. The organisms do not grow or carry out a fermentation in the food, but do release a bacteriocin which kills or inhibits *Listeria monocytogenes*, *Clostridium botulinum*, and other food-borne pathogens and spoilage organisms. Because the antimicrobial agent is produced by a "food-grade" bacterium, the method can be considered safe and natural.

Horticulture

Title: '609' Buffalograss

Number: 8475

Scientists: T.P. Riordan, S.A. de Shazer, F.P. Baxendale, E.J. Kinbacher, J.F. Svoboda, L.A. Wit, and M.C. Engelke

Description: Cultivar 609 buffalograss has a fine texture, excellent color, a low growth habit and an ability to stay greener late into the fall than most other warm-season buffalograsses. It is very drought tolerant and is resistant to most insect and disease pests. It requires less fertilizer, less mowing, less water and less pesticides than cool-and warm-season turfgrasses currently in use. Low water use and drought stress avoidance are important characteristics of the drought resistant buffalograss. Cultivar 609 has been shown to have excellent drought stress tolerance and water use rate is less than those of other commonly cultivated turfgrass species. It is one of the first turf-type buffalograsses developed specifically for golf and law use.



ARD is one of five divisions within the Institute of Agriculture and Natural Resources (IANR) at the University of Nebraska. IANR was established by the Nebraska legislature in 1973 and has its headquarters on the University of Nebraska-Lincoln East Campus.

The University of Nebraska system has four campuses: University of Nebraska-Lincoln, University of Nebraska Medical Center, University of Nebraska at Omaha and the University of Nebraska at Kearney. The University of Nebraska system is governed by an elected Board of Regents and administered by a system and campus administration.

Administrative Personnel (June 1994)

University of Nebraska Board of Regents

Robert M. Allen, Hastings
Don S. Blank, McCook
Nancy Hoch, Nebraska City
Nancy O'Brien, Waterloo

John Payne, Kearney
Margaret Robinson, Norfolk
Rosemary Skrupa, Omaha
Charles S. Wilson, Lincoln

Student Regents

UNMC – Alan Linderman
UNO – Matt Schulz
UNL – Andrew Loudon
UNK – Jennifer Prince

Administrative Officers

L. Dennis Smith, President, University of Nebraska

Graham S. Spanier, Chancellor, University of Nebraska-Lincoln

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

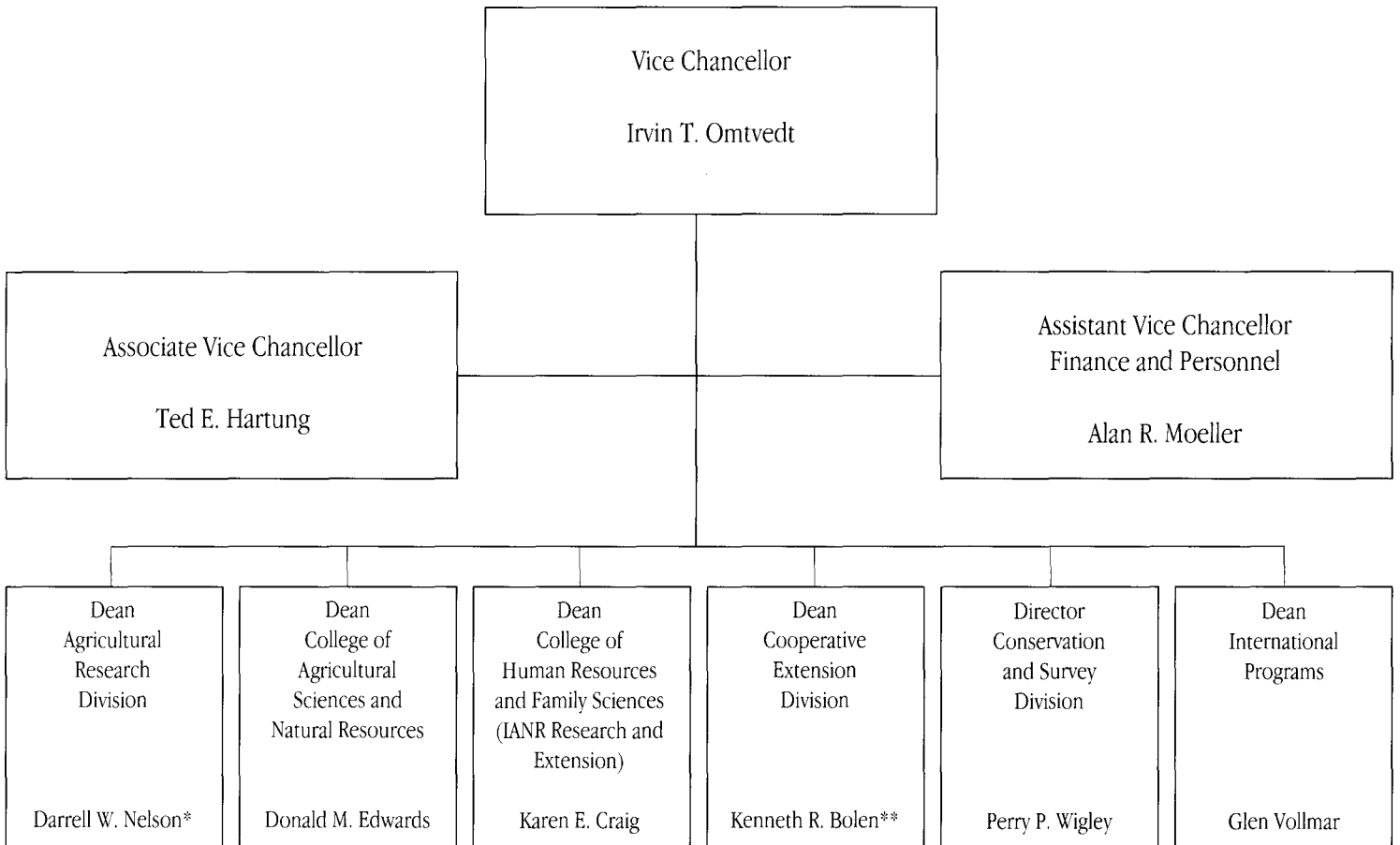
Agricultural Research Division

Darrell W. Nelson, Dean and Director
Dale H. Vanderholm, Associate Dean and Director
Karen E. Craig, Assistant Director/Home Economics
Steven S. Waller, Assistant Dean/Assistant Director
Alan R. Doster¹, Administrative Intern
Dora Dill, Staff Assistant
Diane Mohrhoff, Clerical Assistant III
Nelvie Lienemann, Staff Secretary III
Mary Jacobs¹, Temporary/On Call

¹Temporary appointment

Organizational Chart

Institute of Agriculture and Natural Resources University of Nebraska-Lincoln



*Director, Nebraska Agricultural Experiment Station

**Director, University of Nebraska Cooperative Extension

Administrative Units Reporting to Deans and Directors

Institute of Agriculture and Natural Resources

The University of Nebraska — Lincoln

June 1994

Agricultural/Natural Resources Departments

Agricultural Economics
Sam Cordes, Head

Agricultural Leadership, Education and Communication
Allen Blezek, Head

Agricultural Meteorology
Blaine Blad, Head

Agronomy
P. Steve Baenziger, Head

Animal Science
Elton Aberle, Head

Biochemistry
Marion O'Leary, Head

Biological Systems Engineering
Glenn Hoffman, Head

Biometry
David Marx, Head

Entomology
Z B Mayo, Head

Food Science and Technology
Steve Taylor, Head

Forestry, Fisheries and Wildlife
Gary Hergenrader, Head

Horticulture
Paul Read, Head

IANR Communications and Computing Services
Ted Hartung, Director

Plant Pathology
Anne Vidaver, Head

Veterinary and Biomedical Sciences
Jack Schmitz, Head

College of Human Resources and Family Sciences

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
Mead—Daniel Duncan, Director

Northeast Research and Extension Center
Concord—Robert Fritschen, Director

Panhandle Research and Extension Center
Scottsbluff—Burt Weichenthal¹,
Interim Director
—Charles Hibberd², Director

South Central Research and Extension Center
Clay Center—Charles Stonecipher,
Director

Southeast Research and Extension Center
Lincoln—Loyd Young, Director

West Central Research and Extension Center
North Platte—Pete Jacoby, Jr.,
Director

Interdisciplinary Centers

Biotechnology Center
Don Weeks, Director

Food Processing Center
Steve Taylor, Director

Great Plains Regional Center for Global Environmental Change
William Easterling, Director

Industrial Agricultural Products Center
Milford Hanna, Director

International Trade Policy Center
Robert McGeorge, Director

Rural Community Revitalization/Development Center
Sam Cordes, Director

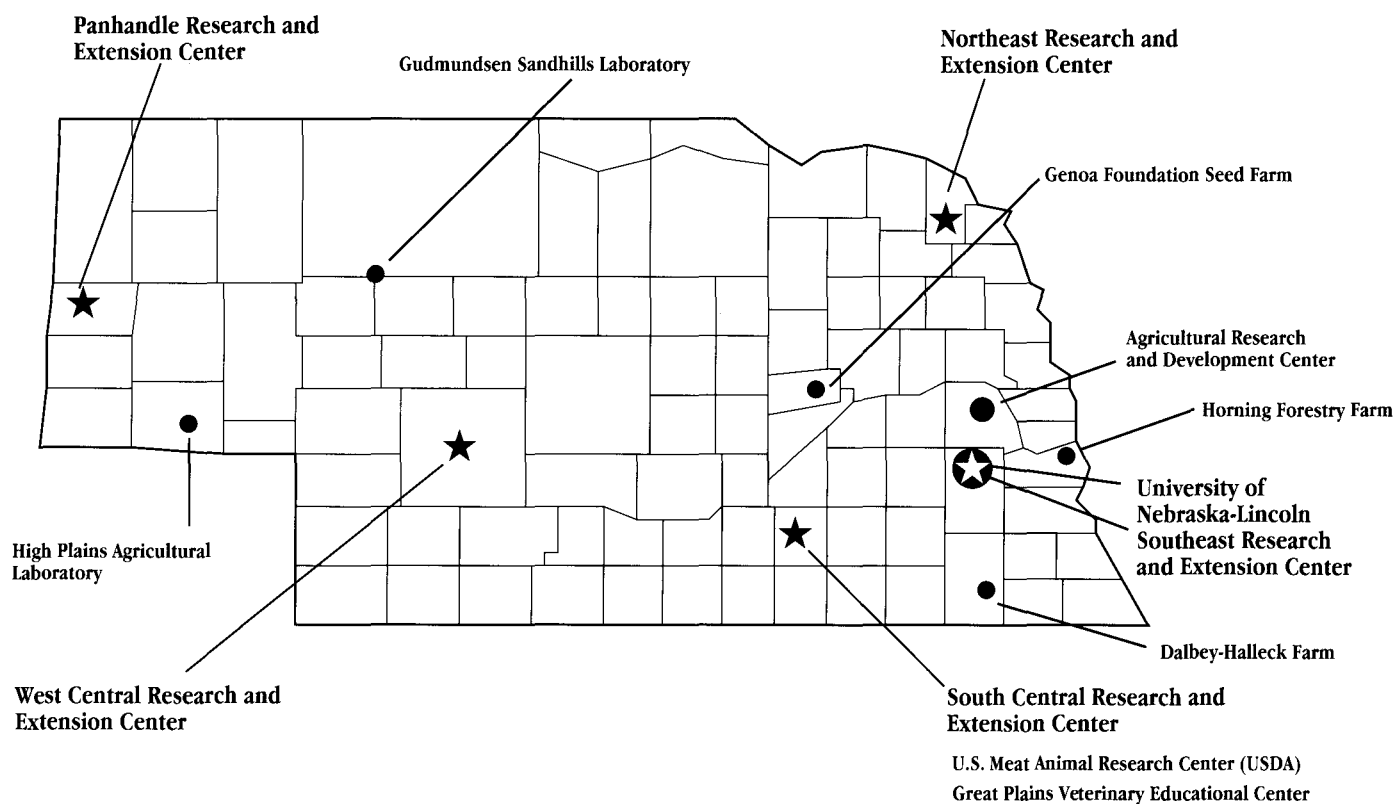
Center for Sustainable Agricultural Systems
Chuck Francis, Director

Water Center/Environmental Programs
Bob Volk, Director

¹Ended appointment during 1993-94

²Began appointment during 1993-94

IANR Research Facilities



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

- Agricultural Research and Development Center — Mead
- Dalbey-Halleck Farm — Virginia
- Genoa Foundation Seed Farm — Genoa
- Gudmundsen Sandhills Laboratory — Whitman
- High Plains Agricultural Laboratory — Sidney
- Horning Forestry Farm — Plattsmouth
- Northeast Research and Extension Center — Concord
- Panhandle Research and Extension Center — Scottsbluff
- South Central Research and Extension Center, Great Plains Veterinary Educational Center, and the U.S. Meat Animal Research Center (USDA) — Clay Center
- Southeast Research and Extension Center — Lincoln
- West Central Research and Extension Center — North Platte

Approximately 260 faculty members have research appointments in ARD. Most have joint appointments, and carry teaching and extension responsibilities, as well.

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

The percentages listed represent the proportion of a faculty member's time assigned to each. The primary research responsibility is identified for each. The rank listed is for July 1993–June 1994.

Four departments contain U.S. Department of Agriculture Agricultural Research Service scientists. USDA Forest Service employees are affiliated with the Department of Forestry, Fisheries and Wildlife. They are designated USDA in this listing.

All ARD off-campus personnel who are located at Centers are associated with an on-campus department, as well.

Agricultural/Natural Resources Departments

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Agricultural Economics						
Sam M. Cordes	Professor	0.40	0.30	0.30		Head
John C. Allen	Assistant Professor	0.35	0.65			Rural Sociology
J. David Aiken	Professor	0.50	0.30	0.20		Agricultural and Natural Resources Law
Dale G. Anderson	Professor	0.60		0.40		Marketing and International Development
Azzeddine Azzam	Associate Professor	0.70		0.30		Marketing and Quantitative Methods
Maurice E. Baker	Professor	0.20		0.80		Resource Economics
Dennis Conley	Associate Professor	0.35		0.65		Agribusiness
Glenn A. Helmers	Professor	0.60		0.40		Production Economics
Bruce B. Johnson	Professor	0.45		0.55		Resource and Community Economics
H. Douglas Jose	Professor	0.20	0.80			Farm and Ranch Management
Raymond E. Massey	Assistant Professor	0.25	0.75			Farm Management
Robert McGeorge	Assistant Professor	0.25			0.75	International Trade Law
Timothy A. Park ¹	Assistant Professor	0.70	0.30			Production and Resource Economics
Richard Perrin ²	Professor	0.75		0.25		Production Economics, Policy Analysis
Wesley F. Peterson	Associate Professor	0.75		0.25		International Trade
George H. Pfeiffer	Associate Professor	0.25		0.75		Farm and Ranch Management
Jeffrey S. Royer	Associate Professor	0.70		0.30		Agribusiness and Marketing
Raymond J. Supalla	Professor	0.75		0.25		Resource Economics

Agricultural Leadership, Education and Communication

Allen G. Blezek	Professor	0.15	0.12	0.48	0.25	Head
Roy D. Dillon ¹	Professor	0.30		0.70		Curriculum, Advanced Studies and Development
O.S. Gilbertson	Professor	0.25	0.15	0.60		Teacher Education/Leadership Development
Terrence Meisenbach	Assistant Professor			0.25	0.75	Publications
Gary L. Vacin	Professor	0.25	0.50	0.25		Media Technology/Leadership Development

Agricultural Meteorology

Blaine Blad	Professor	0.80	0.10	0.10		Head
William Easterling	Associate Professor	0.60	0.40			Agricultural Climatology
Kenneth Hubbard	Professor	0.67	0.23	0.10		Agricultural Climatology
Joon Kim ²	Assistant Professor	1.00				Agricultural Meteorology
Steve Meyer ²	Assistant Professor	0.50	0.50			Agricultural Climatology
David Stooksbury ²	Assistant Professor	0.40			0.60	Agricultural Climatology
Shashi Verma	Professor	0.85		0.15		Agricultural Meteorology
Elizabeth Walter-Shea	Assistant Professor	0.85		0.15		Agricultural Meteorology
Albert Weiss	Professor	0.50	0.35	0.15		Agricultural Meteorology
Donald Wilhite	Professor	0.85		0.15		Agricultural Climatology

¹ Ended research appointment during 1993-1994

² Began research appointment during 1993-1994

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Agronomy						
P. Stephen Baenziger	Professor	0.40	0.30	0.30		Head
Bruce E. Anderson	Associate Professor	0.40	0.60			Forage Management
David J. Andrews	Professor	1.00				Millet and Sorghum Breeding
Timothy J. Arkebauer	Assistant Professor	0.85	0.15			Crop Environment Physiology
Max Clegg	Associate Professor	0.85	0.15			Crop Physiology
Steven D. Comfort	Assistant Professor	0.75	0.25			Soil Environmental Chemist
Betsy Dierberger	Assistant Instructor	0.23		0.77		Soil Science
John W. Doran	Professor				USDA	Soil Biochemistry
Jerry D. Eastin	Professor	0.85	0.15			Crop Physiology
James R. Ellis	Associate Professor				USDA	Soil Microbiology
Charles A. Francis	Professor	0.40	0.35		0.25	Cropping Systems/Sustainable Agriculture Systems Center
Kenneth D. Frank	Associate Professor	0.50	0.50			Soil Fertility/Soil Testing
George L. Graef	Assistant Professor	0.85		0.15		Soybean Breeding
Robert Graybosch	Associate Professor				USDA	Wheat Genetics
Blaine Johnson	Associate Professor	0.80		0.20		Quantitative Genetics
Alice J. Jones	Associate Professor	0.50	0.50			Soil Conservation
Heidi F. Kaeppler ²	Assistant Professor				USDA	Sorghum Genetics
Shawn M. Kaeppler	Assistant Professor	0.80		0.20		Plant Molecular Cytogenetics
Donald J. Lee	Assistant Professor	0.40	0.60			Plant Genetics
David T. Lewis	Professor	0.40	0.60			Soil Genesis Classification
Jerry Maranville	Professor	0.85	0.15			Sorghum Physiology
Alexander Martin	Professor	0.33	0.67			Weed Science
Stephen C. Mason	Associate Professor	0.50	0.50			Cropping Systems
Robert A. Masters	Assistant Professor				USDA	Range Weed Control
Dennis McCallister	Associate Professor	0.40	0.60			Soil Chemistry
Lloyd N. Mielke ¹	Professor				USDA	Soil Physics
Kenneth Moore ¹	Associate Professor				USDA	Forage Quality
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
Scott J. Nissen	Assistant Professor	0.75	0.25			Weed Physiology
Jeffrey Pedersen	Associate Professor				USDA	Sorghum Genetics and Breeding
C. James Peterson	Associate Professor				USDA	Wheat Genetics
Todd Peterson	Assistant Professor	.40	.60			Cropping Systems
James F. Power	Professor				USDA	Soil Fertility
William L. Powers	Professor	0.88		0.12		Soil Physics
Donald H. Sander	Professor	0.50	0.50			Organic Waste Management
James S. Schepers	Professor				USDA	Soil Chemistry
Walter H. Schacht ²	Assistant Professor	0.60	0.40			Range Science
Patrick J. Shea	Professor	0.80	0.20			Herbicide Dissipation
David R. Shelton	Assistant Professor	0.80	0.20			Cereal Chemist
Joseph H. Skopp	Associate Professor	0.50	0.50			Soil Physics
Roy F. Spalding	Professor	0.25		0.10	0.60	Hydrochemist
James E. Specht	Professor	0.80		0.20		Soybean Physiology and Breeding
Paul E. Staswick	Associate Professor	0.85	0.15			Plant Molecular Biologist
James Stubbendieck	Professor	0.50		0.50		Range Ecology and Management
Dale Swartzendruber	Professor	0.90		0.10		Soil Physics
Mary Thomas-Compton	Assistant Professor	1.00				Popcorn Breeding
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
Wallace W. Wilhelm	Associate Professor				USDA	Crop Physiology

¹ Ended research appointment during 1993-1994

² Began research appointment during 1993-1994

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Animal Science						
Elton D. Aberle	Professor	0.35	0.34	0.31		Head
Sara M. Azzam	Assistant Professor					Industry Systems
Mary M. Beck	Associate Professor	0.70		0.30		Poultry Physiology
Gary L. Bennett	Associate Professor				USDA	Systems
Michael D. Bishop	Assistant Professor				USDA	Breeding
Dennis R. Brink	Professor	0.30		0.70		Ruminant Nutrition
Robert A. Britton ¹	Professor	0.70		0.30		Ruminant Biochemistry
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 ²	Professor	0.18	0.07		0.75	BSE Meat and Poultry Byproduct Chem Engineering
Larry V. Cundiff	Professor				USDA	Breeding
Calvin L. Ferrell	Associate Professor				USDA	Nutrition
J. Joe Ford	Professor				USDA	Physiology
Richard J. Grant	Assistant Professor	0.70	0.30			Dairy Nutrition
Keith E. Gregory	Professor				USDA	Breeding
H. Edward Grotjan, Jr.	Professor	0.60		0.40		Physiology
Thomas G. Jenkins	Associate Professor				USDA	Breeding
Rodger K. Johnson	Professor	0.60		0.40		Swine Breeding
Steven J. Jones	Associate Professor	0.50		0.50		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
Mohammad Koohmaraie	Assistant 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 Physiology
Austin J. Lewis	Professor	0.70		0.30		Swine Nutrition
Kreg A. Leymaster	Associate Professor				USDA	Breeding
Donald D. Lunstra	Professor				USDA	Physiology
Roger W. Mandigo	Professor	0.60		0.40		Meats
Phillip S. Miller	Assistant Professor	0.60		0.40		Swine Nutrition
Mark Morrison	Assistant Professor	0.38		0.12	0.50	Rumen Microbiology
Merlyn K. Nielsen	Professor	0.60		0.40		Breeding and Genetics
J. Calvin Parrott, III	Professor					Industry Ruminant Nutrition
Jerome C. Pekas	Associate Professor				USDA	Nutrition
Rick J. Rasby	Associate Professor	0.25	0.75			Beef Management
Andrew J. Roberts	Assistant Professor				USDA	Physiology
Gary A. Rohrer	Assistant Professor				USDA	Breeding
Sheila E. Scheideler	Associate Professor	0.25	0.75			Poultry Management
Rick A. Stock	Associate Professor	0.50	0.50			Feedlot Nutrition
L. Dale Van Vleck	Professor	0.05		0.15	USDA	Breeding and Genetics
Vincent H. Varel ²	Associate Professor				USDA	Bacterial Physiology
Thomas H. Wise	Assistant Professor				USDA	Physiology
Jong-Tseng Yen	Associate Professor				USDA	Nutrition
Lawrence D. Young	Associate Professor				USDA	Breeding
Dwane R. Zimmerman	Professor	0.50		0.50		Swine Physiology

¹ Ended research appointment during 1993-1994

² Began research appointment during 1993-1994

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Biochemistry						
Marion H. O'Leary	Professor	0.50		0.25	0.25	Head
Ruma V. Banerjee	Assistant Professor	0.85		0.15		Mechanistic Enzymology
Raymond Chollet	Professor	0.90		0.10		Photosynthesis
Richard Dam	Associate Professor	0.84		0.16		Nutritional Biochemistry
Sylvia C. Darr	Assistant Professor	0.90		0.10		Molecular Biology
John H. Golbeck	Professor	0.90		0.10		Biophysics/Chemistry of Photosystems
Robert V. Klucas	Professor	0.90		0.10		Nitrogen Fixation
Herman W. Knoche	Professor	0.40		0.40		Lipid Biochemistry
John P. Markwell	Professor	0.80		0.10		Plant Biochemistry
Stephen W. Ragsdale	Associate Professor	0.85		0.15		Enzymes
Robert J. Spreitzer	Professor	0.85		0.15		Plant Molecular Genetics
Fred W. Wagner	Professor	0.50				Enzymes
Donald P. Weeks	Professor	0.15		0.85		Plant Molecular Biology
Biological Systems Engineering						
Glenn J. Hoffman	Professor	0.35	0.50	0.15		Head
Leonard L. Bashford	Professor	0.65		0.35		Tractors and Design Engineering
L. Davis Clements ²	Professor	0.37	0.13		0.50	Meat and Poultry Byproducts
Dean E. Eisenhauer	Professor	0.75		0.25		Surface Irrigation and Chemigation
Thomas G. Franti ²	Assistant Professor	0.25	0.75			Surface Water Management
John E. Gilley	Associate Professor				USDA	Soil Erosion
Robert D. Grisso	Associate Professor	0.25	0.75			Agricultural Machinery
G. LeRoy Hahn	Professor				USDA	Livestock Housing and Stress Management
Milford A. Hanna	Professor	0.50		0.10	0.25	Food and Bioprocess Engineer
Terry A. Howell	Professor				USDA	Irrigation Scheduling
David D. Jones	Assistant Professor	0.35		0.65		Product Handling and Storage
Michael F. Kocher	Associate Professor	0.40		0.60		Controls Engineer
Louis I. Leviticus	Professor	0.40		0.10	0.50	Power and Machinery Engineering
Derrel L. Martin	Associate Professor	0.65		0.35		Sprinkler Irrigation
Michael M. Meagher	Assistant Professor			0.20	0.80	Bioprocess Engineering
George E. Meyer	Associate Professor	0.60		0.40		Plant Growth Modeling
Lloyd Mielke ¹	Professor				USDA	Soil Management/Tillage
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
Kenneth Von Bargaen	Professor	0.55		0.45		Equipment Systems Management
Darrell Watts	Professor	0.60	0.40			Water Quality/Irrigation
Curtis L. Weller	Assistant Professor	0.60		0.20	0.20	Food and Bioprocess Engineering
Wayne Woldt	Assistant Professor	0.25	0.50		0.25	Bioenvironmental Engineering
Biometry						
David B. Marx	Professor	0.50		0.50		Head
Kent Eskridge	Associate Professor	0.60		0.40		Statistical Consultant
Carol Gotway	Assistant Professor	0.65		0.35		Statistical Consultant
Stephen D. Kachman	Assistant Professor	0.75		0.25		Statistical Consultant
Anne Parkhurst	Professor	0.50		0.50		Statistical Consultant
Walter W. Stroup	Professor	0.50		0.50		Statistical Consultant
Linda J. Young	Associate Professor	0.75		0.25		Statistical Consultant

¹ Ended research appointment during 1993-1994

² Began research appointment during 1993-1994

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Entomology						
Z B Mayo	Professor	0.67	0.07	0.17		Head
Frederick P. Baxendale	Associate Professor	0.25	0.75			Turf Insects
Stephen D. Danielson	Associate Professor	0.25	0.75			Forage Insects
Mary Ellen Dix	Associate Professor				USDA	Shelterbelt Insects
John E. Foster	Professor	0.40	0.50	0.10		Insect Genetics
Leon G. Higley	Associate Professor	0.80		0.20		Insect Ecology
Wayne L. Kramer	Assistant Professor				1.00	Medical Entomology
Lance J. Meinke	Associate Professor	0.80		0.20		Soil Insects
James J. Petersen	Professor				USDA	Livestock Entomology
Richard D. Peterson	Assistant Professor				USDA	Livestock Entomology
Thomas O. Powers	Associate Professor				1.00	Molecular Systematics
Kenneth P. Pruess	Professor	0.63	0.17	0.20		Aquatic Insects
Blair D. Siegfried	Associate Professor	0.80		0.20		Insect Toxicologist
Steven R. Skoda	Assistant Professor				USDA	Livestock Entomology
David W. Stanley-Samuels	Associate Professor	0.73	0.27			Insect Physiologist
David B. Taylor	Associate Professor				USDA	Livestock Entomology
Gustave D. Thomas	Professor				USDA	Livestock Entomology
Food Science and Technology						
Steve L. Taylor	Professor	0.40	0.34	0.26		Head
Lloyd B. Bullerman	Professor	0.60	0.10	0.30		Food Microbiology/Mycology
Susan B. Cuppett	Associate Professor	0.60		0.40		Food Lipids
Glenn W. Froning	Professor	0.75		0.25		Poultry Products
Milford A. Hanna ²	Professor	0.20			0.80	Food and Bioprocess Engineer
Robert W. Hutkins	Assistant Professor	0.65		0.35		Food Biotechnology
David S. Jackson	Assistant Professor	0.70	0.30			Cereals/Oilseeds Processing
Michael M. Meagher	Assistant Professor	0.80		0.20		Food Engineering
John H. Rupnow ¹	Professor	0.40		0.60		Food Biochemistry/Microbiology
Khem H. Shahani	Professor	0.45	0.33	0.05		Food Chemistry
Durward A. Smith	Associate Professor	0.22	0.33		0.45	Horticultural Food Crops Processing
Susan S. Sumner	Assistant Professor	0.30	0.70			Food Microbiology
Curtis L. Weller	Assistant Professor			0.20	0.80	Food and Bioprocess Engineer
Randy L. Wehling	Associate Professor	0.50		0.50		Food Analysis
Michael G. Zeece	Assistant Professor	0.75		0.25		Food Protein Chemistry
Forestry, Fisheries and Wildlife						
Gary L. Hergenrader	Professor	0.17	0.16	0.17	0.50	Head
James R. Brandle	Associate Professor	0.70		0.30		Forestry/Windbreaks
Ronald M. Case	Professor	0.25		0.75		Wildlife
Bert M. Cregg	Assistant Professor				USDA	Forestry
Stephen G. Ernst	Associate Professor	0.75		0.25		Forest Genetics
Mark O. Harrell	Associate Professor	0.25			0.75	Forest Entomology
Kyle D. Hoagland	Associate Professor	0.75		0.25		Limnology
Dennis E. Jelinski	Assistant Professor	0.25		0.75		Landscape Ecology
Ron J. Johnson	Professor	0.31	0.43		0.26	Wildlife Management
Terrence B. Kayes	Associate Professor	0.25	0.75			Aquaculture
Ted B. Klopfenstein	Assistant Professor				USDA	Forestry
Edward J. Peters	Associate Professor	0.40		0.60		Fisheries
Willis J. Rietveld	Professor				USDA	Agroforestry
Julie A. Savidge	Associate Professor	0.40		0.60		Wildlife
Michele M. Schoenberger	Assistant Professor				USDA	Forestry

¹ Ended research appointment during 1993-1994

² Began research appointment during 1993-1994

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Horticulture						
Paul E. Read	Professor	0.43	0.33	0.24		Head
Dermot P. Coyne	Professor	0.96		0.04		Vegetable Breeding
Roch E. Gaussoin	Assistant Professor	0.25	0.75			Turfgrass Management and Physiology
William A. Gustafson	Associate Professor	0.25	0.60	0.15		Fruit and Nut Crops
Laurie Hodges	Assistant Professor	0.40	0.60			Vegetable Production and Development
Garald L. Horst	Associate Professor	0.75		0.25		Turfgrass Physiology and Management
Ellen T. Paparozzi	Associate Professor	0.50		0.50		Ornamentals
Terrance P. Riordan	Professor	0.89	0.11			Turf Breeding
Sotero S. Salac	Associate Professor	0.50		0.50		Ornamentals
Durward A. Smith	Associate Professor	0.18	0.27		0.55	Food Processing
IANR Communications and Computing Services						
Ted Hartung	Professor	0.12	0.14	0.10	0.64	Director
Richard L. Fleming	Professor	0.25	0.67	0.08		News
James W. King	Associate Professor	0.20	0.50	0.30		Publications/Visual Aids
Terrence Meisenbach	Assistant Professor	0.20	0.55		0.25	Publications
James K. Randall	Professor	0.10	0.90			Radio
Plant Pathology						
Anne K. Vidaver	Professor	0.75	0.15	0.10		Head
Martin B. Dickman	Associate Professor	0.85		0.15		Genetics of Host/Parasite Interactions
Roy C. French	Assistant Professor				USDA	Viruses and Nucleic Acids
Stan G. Jensen	Associate Professor				USDA	Corn and Sorghum Diseases
Leslie C. Lane	Associate Professor	0.85		0.15		Virus Diseases
Willem G. Langenberg	Professor				USDA	Virus Diseases
Amit Mitra	Assistant Professor	1.00				Plant Vector/Plant Transformation
James Partridge	Associate Professor	0.85		0.15		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
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	Assistant Professor	0.85		0.15		Soilborne Diseases

¹ Ended research appointment during 1993-1994

² Began research appointment during 1993-1994

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Veterinary and Biomedical Sciences						
John A. Schmitz	Professor	0.65	0.15	0.20		Head
Raul Barletta	Assistant Professor	0.90	0.10			Molecular Biology
Alex Chen	Associate Professor	0.90	0.10			Cellular Immunology
Catherine E. Dewey	Assistant Professor	0.50	0.35		0.15	Swine Medicine
Ruben O. Donis	Assistant Professor	0.85	0.15			Molecular Virology
Alan R. Doster	Professor				1.00	Diagnostic Pathology
Gerald E. Duhamel	Assistant Professor	0.80	0.10		0.10	Diagnostic/Research Pathology
E. Denis Erickson	Professor			0.30	0.70	Diagnostic Bacteriology
Dee Griffin	Associate Professor		0.30	0.50	0.20	Beef Cattle Medicine
Deborah Hamernik	Assistant Professor	0.90	0.10			Transgenic Animal Systems
Clinton Jones	Associate Professor	0.90	0.10			Molecular Virology
Clayton L. Kelling	Associate Professor	0.90	0.10			Research Virology
Marjorie F. Lou ²	Professor	1.00				Research Biochemistry
Rodney A. Moxley	Associate Professor	0.25		0.10	0.65	Diagnostic/Research Pathology
Fernando Osorio	Associate Professor	0.50			0.50	Diagnostic/Research Virology
Louis J. Perino	Assistant Professor	0.30	0.50		0.20	Beef Cattle Medicine
Duane N. Rice	Professor		0.52	0.43	0.04	Dairy and Beef Cattle Diseases
Douglas G. Rogers	Assistant 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	Preveterinary Advisor/Toxicology
S. Srikumaran	Associate Professor	0.85		0.15		Immunology
Barbara Straw	Professor		0.80	0.10	0.10	Swine Diseases
Eva Wallner-Pendleton	Assistant Professor			0.60	.40	Poultry Diseases
Dale M. Webb	Assistant Professor				1.00	Diagnostic Pathology

College of Human Resources and Family Sciences

Family and Consumer Sciences

Shirley Baugher	Professor	0.37	0.11	0.52		Chair
Douglas A. Abbott	Associate Professor	0.25		0.75		Youth at Risk
E. Raedene Combs	Professor	0.50			0.50	Housing, Aged
Elizabeth Davis	Associate Professor	0.25		0.75		Family Economics
John D. DeFrain	Professor	0.50		0.50		Youth at Risk
Jeanne Karns	Assistant Professor	0.25			0.61	Infant Social Development
Kathy Prochaska-Cue	Associate Professor	0.25		0.75		Family Management
Craig W. Smith	Associate Professor	0.25		0.75		Family Interactions
John Woodward ¹	Professor	0.48		0.52		Youth at Risk
Pauline Davey Zeece	Associate Professor	0.25		0.75		Child Care

Nutritional Science and Dietetics

Marilynn Schnepf	Associate Professor	0.40	0.10	0.30	0.20	Chair
Judy Driskell	Professor	0.50		0.50		Nutrition
Julie Albrecht	Assistant Professor	0.25	0.75			Food Safety
Nancy M. Betts	Associate Professor	0.49		0.51		Nutrition
Fayrene Hamouz	Assistant Professor	0.30		0.70		Restaurant Management
Constance Kies ¹	Professor	0.50		0.50		Nutrition
Nancy Lewis	Assistant Professor	0.44		0.56		Nutrition
Kaye Stanek	Associate Professor	0.25		0.75		Nutrition

¹ Ended research appointment during 1993-1994

² Began research appointment during 1993-1994

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Textiles, Clothing and Design						
Rita C. Kean	Associate Professor	0.32	0.08	0.60		Chair
Patricia Cox Crews	Associate Professor	0.25		0.50	0.25	Textile Conservation and Science
Joan Laughlin	Professor	0.10	0.20	0.70		Textiles
Shirley Niemeyer	Associate Professor	0.25		0.75		Environmental Issues
Off-Campus Research and Extension Centers						
						Department (Area of Responsibility)
Northeast Research and Extension Center						
Robert D. Fritschen	Professor	0.25	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 (Waste Management)
Terry L. Mader	Professor	0.50	0.50			Animal Science (Beef Cattle)
David Holshouser	Assistant Professor	0.40	0.60			Agronomy (Weed Science)
Timothy A. Powell	Assistant Professor	0.40	0.60			Agricultural Economics (Farm Management)
Charles A. Shapiro	Associate Professor	0.50	0.50			Agronomy (Soils and Agronomic Crops)
David P. Shelton	Professor	0.50	0.50			Biological Systems Engineering (Soil Conservation)
John F. Witkowski	Professor	0.50	0.50			Entomology (Crops, Insects and Chemigation)
Panhandle Research and Extension Center						
Charles A. Hibbert ²	Professor	0.42	0.50		0.08	Director
Burton A. Weichenthal	Professor	0.50	0.50			Associate Director and Animal Science (Beef Cattle)
David D. Baltensperger	Associate Professor	0.75	0.25			Agronomy (Crop Breeding)
Gregory D. Binford	Assistant Professor	0.50	0.50			Agronomy (Soil Science)
Dale M. Grotelueschen	Associate Professor	0.50	0.50			Diagnostic Veterinary Medicine (Vet Science)
Gary L. Hein	Associate Professor	0.50	0.50			Entomology (Entomology)
Eric D. Kerr	Professor	0.50	0.50			Plant Pathology (Plant Path)
Drew J. Lyon	Assistant Professor	0.50	0.50			Agronomy (Dryland Crops)
Alexander D. Pavlista	Assistant Professor	0.25	0.75			Horticulture (Potatoes)
Patrick E. Reece	Associate Professor	0.50	0.50			Agronomy (Range and Forage)
Ivan G. Rush	Professor	0.25	0.75			Animal Science (Beef Cattle)
John A. Smith	Associate Professor	0.50	0.50			Biological Systems Engineering (Machinery Systems)
Robert G. Wilson	Professor	0.50	0.50			Agronomy (Weed Science)
C. Dean Yonts	Associate Professor	0.50	0.50			Biological Systems Engineering (Irrigation)
South Central Research and Extension Center						
Charles L. Stonecipher	Professor	0.14	0.78		0.08	Director
Joel Cahoon	Assistant Professor	0.50	0.50			Biological Systems Engineering (Water Quality Management)
Benjamin L. Doupnik, Jr.	Professor	0.50	0.50			Plant Pathology (Field Crop Diseases)
Roger Elmore	Associate Professor	0.50	0.50			Agronomy (Crop Production)
Richard Ferguson	Assistant 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)
Robert Wright	Associate Professor	0.50	0.50			Entomology (Biological Control)
Southeast Research and Extension Center						
Loyd D. Young	Professor	0.05	0.87	0.08		Director

¹ Ended research appointment during 1993-1994

² Began research appointment during 1993-1994

	Rank	Rsch	Ext	Tch	Other	Department (Area of Responsibility)
West Central Research and Extension Center						
Pete W. Jacoby, Jr.	Professor	0.50	0.50			Director
Delwyn D. Dearborn ¹	Professor	0.50	0.50			Interim Director; Associate Director
Don D. Adams	Associate Professor	0.50	0.50			Animal Science (Range Cattle Nutrition)
John B. Campbell	Professor	0.50	0.50			Entomology (Livestock/Crops)
Richard Clark	Associate Professor	0.40	0.60			Agricultural Economics (Farm/Ranch Management)
Gene H. Deutscher	Professor	0.28	0.72			Animal Science (Beef Cattle Reproduction)
Gary W. Hergert	Professor	0.50	0.50			Agronomy (Soils/Water Quality)
Jerre Johnson	Professor				1.00	Veterinary Science (Pathology)
Norman L. Klocke	Associate Professor	0.50	0.50			Biological Systems Engineering (Water Resources)
Dale T. Lindgren	Associate Professor	0.50	0.50			Horticulture
Paul T. Nordquist	Professor	1.00				Agronomy (Sorghum/Corn Breeding)
Gail A. Wicks	Professor	0.50	0.50			Agronomy (Ecofarming/Weeds)

Interdisciplinary Activities

Water Center/Environmental Programs

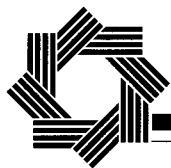
Robert G. Volk	Professor	0.75			0.25	Director
Shripat T. Kamble	Associate Professor	0.25	0.75			Pesticide Impact Assessment
Robert D. Kuzelka	Associate Professor	0.35	0.35		0.30	Assistant Director
Roy F. Spalding	Professor	0.65			0.35	Associate Director
Edward F. Vitzthum	Associate Professor	0.25	0.65	0.10		Coordinator, Environmental Programs

Agricultural Research Division

Darrell W. Nelson	Professor	1.00				Dean and Director
Dale H. Vanderholm	Professor	0.85			0.15	Associate Dean and Director
Karen E. Craig	Professor	0.12	0.13		0.75	Assistant Director
Steven S. Waller	Professor	0.15		0.50	0.35	Assistant Dean and Director

¹ Ended research appointment during 1993-1994

² Began research appointment during 1993-1994



The Agricultural Research Division welcomed 22 visiting scientists and 31 research associates to the campus in 1993-1994. 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

Agricultural/Natural Resources Departments

	Country	Expertise/Discipline
Agronomy		
Geremew Haile	Ethiopia	Corn Breeding and Genetics
Teshome Regassa	Ethiopia	Sorghum Drought Physiology
Amsal Tarekegne	Ethiopia	Wheat and Barley Physiology
Gyula Vida	Hungary	Plant Breeding and Genetics
Gendi Wu	China	Barley and Wheat Breeding and Management
Animal Science		
Mona Abdel Zaher	Egypt	Animal Genetics
Lucia Galvao de Albuquerque	Brazil	Dairy Genetics
Gueorgui I. Dimov	Bulgaria	Dairy Genetics
Joanir Pereira Eler	Brazil	Animal Genetics
Carlo Rossi	Italy	Ruminant Nutrition
Kamal Kishore Singhal	India	Ruminant Nutrition
Margot A.J. Van Engelen	Netherlands	Animal Genetics
Biochemistry		
Manuel Becana	Spain	Biochemistry
Keuk-ki Lee	Japan	Soil Microbiology
Prof. Carlos S. Andreo	Argentina	Plant Enzymology
Valérie Pacquit	France	Plant Biochemistry/Molecular Biology
Klaus Breddam	Denmark	Enzyme Kinetics
Abdel-Fatah Tarrad	Egypt	Agricultural Research
Dietmar Stehlik	Germany	Biophysics
Tetemke Mehari	Ethiopia	Biochemistry
Valerie Terwilliger	USA	Photosynthesis
Entomology		
Rose Marie T. Rosario	Philippines	Insect Biochemistry

Research Associates

State/Country

Expertise/Discipline

Agronomy

Kessavalou Anabayán	Nebraska/USA	Soil Science
Bahman Eghball	Nebraska/USA	Soil Science
Dennis Francis	Nebraska/USA	Soil and Water Science
John Lory	Minnesota/USA	Soil Science
Rajendra Prasad	India	Soil Science, Soil Fertility
Albert Sims	North Carolina/USA	Soil Science
Triant Stasinopoulos	Ohio/USA	Plant Biology
Neal Stolpe	Nebraska/USA	Soil and Water Science
Matias Vanotti	Wisconsin/USA	Soil Science

Animal Science

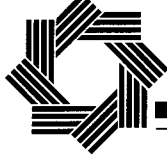
Lisa A. Kriese	Georgia/USA	Animal Genetics
Elizabeth A. Newton	Ohio/USA	Swine Nutrition
Curtis P. Van Tassel	New York/USA	Animal Genetics

Biochemistry

Raúl Arredondo-Peter	Mexico	Biochemistry
Irina Khrebtukova	Russia	Cell Biology
Genhai Zhu	China	Biochemistry
Shinichi Taoka	Japan	Biophysics
Raghavakaimal Padmakumar	India	Chemistry
Rugmini Padmakumar	India	Chemistry
Stephen Duff	Canada	Plant Enzymology
Bin Li	China	Plant Biochemistry
Mark F. Hammer	Arkansas/USA	Plant Physiology
Maria Dean	Nebraska/USA	Bioorganic Chemistry
Paul Scott	Indiana/USA	Molecular Biology
Iliá Vasseliev	Russia	Biophysics
Stephen Todd Swanson	California/USA	Chemistry
Christopher Chastain	Illinois/USA	Plant Physiology
Asma El Kasmi	Belgium	Physical Biochemistry
Manoj Kumar	India	Chemistry
Javier Seravalli	Costa Rica	Chemistry
Wei-ping Lu	China	Microbial Biochemistry

Entomology

Gadelhak Gadelhak	Michigan/USA	Entomology
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Each faculty member with an ARD appointment has a federally-approved research project. A number of faculty have multiple projects. There are 362 research projects in agriculture, natural resources and family sciences. Projects are generally 3-5 years in duration. Faculty also are part of a national network of Agricultural Experiment Station scientists located at land grant universities across the United States. ARD researchers currently are involved with about 65 regional projects in which they conduct cooperative research with scientists at other universities, addressing problems of regional and national importance.

Research projects are listed by units and centers. An asterisk (*) indicates that the project was discontinued in fiscal year 1993-1994.

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 management and 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 Economics

*10-071 rr

Impacts of transportation changes on agricultural marketing and local communities (D. G. Anderson)

10-103 ha

Price spreads and market structure in the beef marketing industry: theory and measurement (A. M. Azzam)

10-106 rr

Private strategies, public policies, and food system performance (A. M. Azzam)

10-107 ha

Management information and management practices on Nebraska farms/ranches (H. D. Jose)

10-108 ha

Monitoring and analysis of farm real estate market development in Nebraska (B. B. Johnson)

10-109 ha

Nebraska water law (J. D. Aiken)

10-111 rr

Quantifying long-run agricultural risks and evaluating farmer responses to risk (D. M. Conley, G. Helmers)

10-112 ha

Legal aspects of national and international regulations of agricultural trade (R. L. McGeorge)

10-113 sg

Impacts of federal agricultural policy on rural communities (S. Cordes, J. Royer, P. Gessaman)

10-114 ha

Labor management of farms in size transition (R. E. Massey)

10-115 ha

Evaluating alternative risk management strategies for Nebraska grain producers (T. Park)

*10-116 rr

The organization and performance of world food systems: implications for U.S. policies (E. W. F. Peterson)

10-117 ha

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

10-118 ha

Economics of beef cattle management systems in Nebraska (G. H. Pfeiffer)

10-119 rr

Policy implications for farm household and rural community responses to economic changes (B. Johnson)

10-120 ha

Structure, efficiency, and viability of agribusiness organizations (J. S. Royer)

10-121 ha

Sustainable communities: community response to institutional change (J. C. Allen)

10-122 cg

Development and application of specific technology assessment techniques (R. K. Perrin)

10-123 sg

Policy impacts on rural communities (S. M. Cordes, J. S. Royer, 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)

Agricultural Leadership, Education and Communication

18-001 st

Dissemination of research information (T. Meisenbach)

24-030 st

Evaluation of interventions in leadership development programs (R. D. Dillon, E. H. Miller)

Agricultural Meteorology

27-003 ha

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

27-004 ha

Spectral radiation techniques to estimate productivity and water stress in vegetation (B. L. Blad, E. Walter-Shea)

27-005 ha

A climate data base and model for estimating crop yields (K. G. Hubbard)

- 27-007 ha**
Drought and climate change: response and policy implications (D. A. Wilhite)
- 27-008 rr**
Variables in agricultural-weather information systems (K. G. Hubbard)
- 27-009 ha**
Climate and agroecosystem modeling: developing information for decision making (A. Weiss)
- 27-010 rr**
Environmental and genotypic control of assimilate allocation in grain crops (S. B. Verma, T. J. Arkebauer)
- 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)
- 27-013 st**
Ultraviolet radiation interactions in a vegetative canopy (E. A. Walter-Shea)

Agronomy

- 12-001 ha**
Corn breeding and genetics (W. A. Compton, P. T. Nordquist)
- 12-002 ha**
Improvement and evaluation of oats and barley (P. S. Baenziger)
- 12-011 ha**
Changes in soil properties associated with changes in land use over the past century (D. T. Lewis)
- 12-055 ha**
Genetics, breeding and evaluation of common wheats, durums and triticales for Nebraska (P. S. Baenziger)
- 12-072 rr**
Introduction, multiplication, evaluation, preservation, cataloguing and utilization of plant germplasm (D. J. Andrews, K. P. Vogel)
- 12-135 rr**
Soil productivity and erosion (A. J. Jones)

- 12-149 st**
Breeding sorghum and pearl millet for USA and developing countries (D. J. Andrews)
- 12-151 ha**
Tillage influence on crop production and physical properties of the soil surface and rhizosphere (A. J. Jones)
- *12-162 ha**
Ecological and agronomical manipulation of Nebraska rangeland vegetation (J. L. Stubbendieck)
- 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. Shelton)
- *12-177 st**
Genetic determinants of baking quality in wheat (R. A. Graybosch)
- 12-178 ha**
Dissipation and bioavailability of herbicides and other pesticides in soil (P. J. Shea)
- *12-180 ha**
Improved production efficiency based on increased herbicide application efficiency (D. A. Mortensen, K. VonBargen)
- 12-181 ha**
Development of profitable reduced herbicide weed management systems through integration (A. R. Martin)
- 12-184 ha**
Soybean breeding and genetic studies for Nebraska (G. L. Graef)
- 12-185 ha**
Methodology of comparing best management practices for groundwater quality protection (W. L. Powers)
- 12-186 ha**
Popcorn breeding for yield and expansion volume (quality) (N. D'Croz-Mason, M. Thomas-Compton)
- 12-187 ha**
Molecular characterization of genetic variation in soybeans (D. J. Lee)
- *12-188 st**
Development of an intermittent sprayer system for reducing chemical input in Nebraska cropping systems (D. A. Mortensen, K. VonBargen, G. E. Meyer, G. A. Wicks)

- *12-189 st**
Mapping of loci affecting the uptake and utilization of nitrogen in maize (B. Johnson, D. Lee, J. Maranville, W. Wilhelm, J. Schepers)
- 12-190 ha**
Leafy spurge: analysis of genetic variation by cpDNA characterization (S. J. Nissen)
- 12-191 cg**
Exploring the interface of qualitative and quantitative variation (P. S. Baenziger)
- *12-192 cg**
Molecular control of soybean vegetative storage protein gene expression (P. E. Staswick)
- 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. Johnson)
- 12-196 ha**
Reaction of synthetic organic compounds with the inorganic components of soils (D. L. McCallister)
- 12-197 ha**
Tissue and cell physiology of sorghum (M. D. Clegg)
- 12-198 ha**
Jasmonate regulated gene expression in soybean (P. Staswick)
- 12-199 ha**
Herbage and livestock production potential from native warm-season grasses (B. E. Anderson, L. E. Moser)
- 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, R. G. Wilson, S. J. Nissen)
- 12-205 sg**
Establishing eurasian origin(s) of North American leafy spurge using DNA markers (S. Nissen, R. A. Masters, D. Lee)
- 12-206 rr**
Water and carbon economy of plants in relation to rhizospheric and atmospheric dynamics (T. Arkebauer)
- 12-207 ha**
Maize production practice influence on grain and stover yield and quality (S. C. Mason)
- *12-208 sg**
Measurements of injected herbicide mobility and persistence in groundwater (R. F. Spalding)
- 12-209 ha**
Procedures for assessing impacts of nonpoint agrichemicals on groundwater (R. F. Spalding)
- 12-210 rr**
Environmental and genotypic control of assimilate allocation in grain crops (T. J. Arkebauer, S. B. Verma)
- 12-211 rr**
Environmental and genotypic control of assimilate allocation in grain crops (M. D. Clegg, J. W. Maranville, J. D. Eastin)
- 12-212 ha**
Water relations, gas exchange and growth of plants and canopies (T. J. Arkebauer)
- 12-213 ha**
Resource-efficient cropping systems for Nebraska (C. A. Francis)
- 12-214 rr**
Nutrient management to sustain productivity while protecting surface and groundwater quality (D. H. Sander, D. T. Walters)
- 12-215 st**
Integrated weed management to improve grasslands of the central Great Plains (R. A. Masters)
- 12-216 st**
Resource-efficient crop production systems (M. D. Clegg, S. C. Mason)



"All of our research has an ultimate objective, to advance knowledge and be applicable to the solution of problems. All of our scientists have to justify their work with potential applications. We specifically ask the question, 'is this significant to Nebraska, the nation and the industry?'"

– Elton Aberle
head, Animal Science
Department

- 12-217 st**
 Nutrient use efficiency in sorghum and pearl millet (J. W. Maranville)
- 12-218 st**
 Soil and crop management practices for erosion control and sustained productivity (J. W. Doran, L. N. Mielke, W. W. Wilhelm, J. R. Ellis, J. F. Power, J. E. Gilley, G. E. Varvel)
- 12-219 st**
 Management of soil, water, and nitrogen resources to protect groundwater quality (J. S. Schepers, W. W. Wilhelm, L. E. Stetson, G. E. Varvel, J. F. Power, J. W. Doran)
- 12-220 ha**
 Selecting wheat and other cereal grains for enhanced end-use performance characteristics (D. R. Shelton, P. S. Baenziger, C. J. Peterson, R. A. Graybosch)
- 12-221 ha**
 Physiology, growth, and development of selected perennial forage grasses (L. E. Moser)
- 12-222 ha**
 Physiological evaluation of cultural and genetic factors influencing seasonal and instantaneous WUE (J. D. Eastin)
- 12-223 sg**
 A sampling strategy to better assess the vertical movement of agrichemicals (W. L. Powers, P. J. Shea, D. B. Marx)
- 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. Skopp)
- 12-227 st**
 Perennial forage grass breeding for Nebraska (K. P. Vogel)
- 12-228 ha**
 Increasing fertilizer efficiency for grain crops (D. H. Sander)
- 12-229 cg**
 Calibration of residual soil nitrate for predicting supplemental N for sorghum (D. H. Sander, K. D. Frank, E. J. Penas)

- 12-230 ha**
 Transport, reactions, and fate of organic contaminants in soil (S. D. Comfort)
- 12-231 ha**
 Application of cytogenetics and molecular genetics to maize improvement (S. Kaeppler)
- 12-232 sg**
 Influence of genetic variation in North American leafy spurge on *Aphthona nigricutis* (S. J. Nissen, R. A. Masters, D. J. Lee, M. L. Rowe)
- 12-233 cg**
 Exploring the interface of qualitative and quantitative genetics (P. S. Baenziger, Y. Yen)
- 12-234 st**
 Cloning differences between plant genomes (S. M. Klaepper)
- 12-235 st**
 Influence of novel and alien genes on the end-use quality of hard winter wheat (R. A. Graybosch)
- 12-236 cg**
 Events, processes and conditions influencing the stability of weed distributions (D. A. Mortensen, A. Gotway, L. J. Young, A. R. Martin)

Animal Science

- 13-036 rr**
 Dairy herd management strategies for improved decision making and profitability (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 (R. A. Stock, T. J. Klopfenstein, T. L. Mader)
- 13-080 ha**
 Factors regulating protein turnover and growth in skeletal muscle (S. J. Jones)
- 13-086 ha**
 Sustainable beef growing-finishing systems (T. J. Klopfenstein, R. A. Stock, R. A. Britton)
- 13-087 ah**
 Uterine function in the bovine with luteal phase deficiency (J. E. Kinder, R. J. Kittok)

- *13-088 ha**
 Physiological and management aspects of expression of estrus and ovulation rate in swine (D. R. Zimmerman, R. K. Johnson, R. J. Kittok, M. M. Beck)
- 13-090 ha**
 Muscle proteolysis and meat tenderness (C. R. Calkins, S. J. Jones)
- *13-094 ah**
 Nutritional impact on gastrointestinal morphology and physiology (E. T. Clemens)
- *13-095 ha**
 Regulation of porcine leydig cell function (R. J. Kittok, J. E. Kinder, H. E. Grotjan)
- 13-096 rr**
 Forage protein characterization and utilization for cattle (T. J. Klopfenstein, L. E. Moser)
- 13-097 rr**
 The genetics of body composition in beef cattle (M. K. Nielsen, R. J. Rasby)
- 13-098 ha**
 Role of gonadotropin heterogeneity in reproductive function (H. E. Grotjan, J. E. Kinder, R. A. Britton)
- 13-099 ah**
 Acidosis and metabolic disorders (R. A. Britton, R. A. Stock, T. J. Klopfenstein)
- 13-100 ha**
 Physiological and nutritional aspects of improving reproduction in dairy cattle (L. L. Larson)
- 13-101 ha**
 Genetic variation for reproduction and energy utilization in mice (M. K. Nielsen)
- 13-102 cg**
 Regulation of ovarian follicular development by circulating progesterone in the bovine (J. E. Kinder)
- 13-104 ha**
 Optimizing the utilization of dietary fiber by dairy cows (R. J. Grant)
- 13-105 ha**
 Nutrition of prolific sows (A. J. Lewis, P. S. Miller)
- 13-106 ha**
 Nutritional value of cereal grains for poultry (T. W. Sullivan, D. J. Andrews, P. S. Baenziger)

13-107 ha
Copper and zinc in beef cow reproduction (D. Brink, R. Rasby)

13-108 ha
Enhancing reproductive efficiency of boars (D. G. Levis)

13-109 rr
Genetic regulation of pork production (R. K. Johnson)

13-110 rr
Factors regulating protein synthesis, degradation and growth in skeletal muscle (S. Jones)

13-111 ha
Processed and manufactured meat technology (R. W. Mandigo)

13-112 ha
Protein and energy constraints of rapid lean growth (P. S. Miller, A. J. Lewis)

13-113 ha
Regulation of gonadotropin synthesis and secretion and ovarian follicle development pre- and postpuberty (J. E. Kinder, R. J. Kittok)

13-114 st
Feed quality improvement of sorghum grain (R. A. Britton, R. A. Stock, J. Pedersen, K. Moore)

13-115 ha
Evaluation of cow/calf weaning management systems to lower feed inputs and to improve economic efficiency (R. Rasby, D. Brink, R. Stock)

13-116 rr
Genetic enhancement of health and survival for dairy cattle (J. Keown)

13-117 cg
Ovarian follicular development in prepubertal heifers: role of LH, FSH and estradiol (J. E. Kinder)

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)

13-121 st
The effects upon rumen microbiology from feeding distillers byproducts (M. Morrison, R. A. Britton, R. A. Stock)

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

Biochemistry

15-022 rr
Regulation of photosynthetic processes (R. Chollet)

15-040 rr
Regulation of photosynthetic processes (J. P. Markwell)

***15-048 ha**
Molecular control of photosynthetic energy production (J. P. Markwell)

15-049 rr
Enhancing beneficial microorganisms in the rhizosphere (R. V. Klucas)

15-050 ha
Functional hemoglobins in plants (R. V. Klucas)

15-054 ha
Isotope fractionation in biological systems (M. H. O'Leary)

15-055 ha
Structure, function and mechanisms of action of peptidases (F. W. Wagner)

15-056 ha
Analysis and metabolism of oxysterols (R. Dam)

15-058 ha
Genetic modification of chloroplast rubisco (R. J. Spreitzer)

15-059 ha
Structure and chemistry of compounds involved in the interactions between wheat and hessian fly (H. W. Knoche)

15-060 ha
Structure, function and organization of photosystem I reaction center (J. H. Golbeck)

15-061 rr
Environmental and genotypic control of assimilate allocation in grain crops (F. W. Wagner)

15-062 ha
Mammalian cobalamin-dependent enzymes (R. Banerjee)

15-063 ha
Enzymology of anaerobic CO₂ fixation and bioremediation (S. W. Ragsdale)

15-064 ha
Structure and function of the ribozyme, ribonuclease P (S. C. Darr)

15-065 cg
Ribonuclease P from the chloroplast and nucleus of *Chlamydomonas reinhardtii* (S. C. Darr)

15-066 cg
Molecular-genetic/biochemical studies of C₃ PEPC and PPKK phosphorylation cycles (R. Chollet)

15-067 ha
Regulation of photosynthetic processes (R. Spreitzer, M. O'Leary)

15-068 cg
Development of dicamba-tolerant plants (D. P. Weeks, P. L. Herman)

15-069 ha
Chloroplast thylakoid protein phosphatase (J. P. Markwell)

9103384 cg
Maintaining functional leghemoglobin in legume modules (R. V. Klucas)

Biological Systems Engineering

11-001 st
Evaluation of performance of new tractors (L. I. Leviticus)

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

11-079 ha
Agricultural tractor testing board: policies and procedures (L. L. Bashford, K. VonBargen, R. D. Grisso)

11-080 ha
Improving field productivity and predicting energy requirements of soil-engaging equipment (R. D. Grisso, L. L. Bashford, L. N. Mielke)

11-081 ha
Electronic image measurement, modeling, and control of plant growth for improved agricultural profitability (G. E. Meyer)

11-082 ha
Decision support systems for the agricultural producer (G. E. Meyer)

11-083 ha
Starch graft copolymers (M. A. Hanna)

11-084 ha
Systems approach to improved energy and water use in greenhouses (D. D. Schulte, G. E. Meyer, J. B. Fitzgerald)

11-085 ha
Evaluation of tractor performance and test data (L. L. Bashford)

11-086 ha
Development of engineering tools to enhance grain industry profitability (D. Jones)

11-087 ha
Fertigation techniques for furrow-irrigated crops using surge irrigation (D. G. Watts)

11-088 sg
Movement of agricultural chemicals beneath conservation tilled-furrow irrigated land (D. E. Eisenhauer, R. B. Ferguson, F. W. Roeth, R. F. Spalding)

11-089 rr
Environmental and genotypic control of assimilate allocation in grain crops (G. E. Meyer)

11-090 rr
Modeling responses of growing pigs (D. Schulte)

11-091 st
Development of engineering solutions for machine control systems for handicapped farmers (L. I. Leviticus, M. F. Kocher)

11-092 sg
Risk-cost management for nitrate-contaminated groundwater uncertainties (M. F. Dahab, W. Woldt, I. Bogardi)

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 production agriculture (L. L. Bashford)

11-095 sg
Improvement of water quality by use of a sensor controlled intermittent sprayer (K. VonBargen, G. Meyer, D. Mortensen)

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



"Food is important to everyone. Ultimately, I hope my work contributes something to society by helping to maintain a safe, higher quality food system."

– Susan Cuppett
food scientist

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)

Biometry

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

Entomology

17-045 rr
Black fly damage thresholds, biology and control (K. P. Pruess)

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

17-048 ha
Ecology and management of legume insects (S. D. Danielson)

17-049 ha
Molecular taxonomy of black flies (K. P. Pruess, T. O. Powers)

17-050 ha
Integrated management of stable flies and house flies on confined livestock (G. D. Thomas, J. J. Petersen, S. R. Skoda)

17-051 ha
Arthropods associated with buffalograss and other turfgrasses in Nebraska (F. P. Baxendale)

***17-053 rr**
Arthropod induced stress on soybeans: evaluation and management (L. G. Higley, J. F. Witkowski)

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

17-055 ha
Physiological consequences and management of arthropod leaf injury to plants (L. G. Higley)

17-056 ha
Determinants of insecticide toxicity in resistant pest and nontarget aquatic insect species (B. D. Siegfried)

17-057 ha
Genetic factors associated with the development of aphid biotypes and insecticide resistance (Z. B. Mayo)

17-058 ha
Biology, ecology, and management of diabrotica species (L. J. Meinke)

17-059 rr
Development of sustainable IPM strategies for soybean arthropod pests (L. G. Higley)

Food Science and Technology

***16-027 rr**
Food quality changes and energy consumption associated with thermal processing in food service system (J. H. Rupnow)

16-033 rr
Marketing and delivery of quality cereals and oilseeds in domestic foreign markets (L. B. Bullerman)

16-044 rr
Factors regulating protein synthesis, degradation and growth in skeletal muscle (M. G. Zeece)

16-048 rr
Development of new processes and technologies for the processing of poultry products (G. W. Froning)

16-050 ha
Genetics and physiology of *Streptococcus thermophilus* (R. W. Hutkins)

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

16-052 ha
Analytical methods for food process control and measurement of processing induced changes (R. L. Wehling)

16-053 ha
Role of proteinase inhibitors in protein degradation (M. G. Zeece)

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

16-055 ha
Food allergies and sensitivities (S.L. Taylor, J. H. Rupnow)

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

16-057 ha
The design of an enzyme reactor for the conversion of hemicellulose to monosaccharides (M. Meagher)

16-058 ha
Occurrence, control and prevention of pathogenic bacteria in foods (S. S. Sumner)

16-059 ha
Identification, purification and characterization of bacteriocins and their evaluation as agents (J. H. Rupnow)

16-060 ha
Evaluation and characterization of antioxidants from plant sources (S. L. Cuppett)

16-061 st
Utilization of poultry skin (G. W. Froning, S. L. Cuppett, R. W. Mandigo, S. S. Sumner, C. L. Weller)

16-062 cg
Characterization of wheat proteins and their relationship to breadmaking quality (R. L. Wehling, M. G. Zeece, D. R. Shelton)

16-063 cg
Physiological studies on *Listeria monocytogenes* (R. W. Hutkins, T. Conway)

16-064 cg
Control of pathogenic microorganisms of fresh fruits and vegetables (S. S. Sumner, L. B. Bullerman, J. A. Albrecht)

Forestry, Fisheries and Wildlife

***26-010 ms**
Effects of water stress on growth and survival of certain deciduous tree species in Nebraska (J. R. Brandle)

26-011 ms
Windbreak shelter effects (J. R. Brandle)

26-012 ms
Biology, ecology, and control of dioryctria borers of pines (M. O. Harrell)

26-013 ha
Ecology and enhancement of wildlife populations in Nebraska (J. A. Savidge)

26-014 ha
Wildlife damage management for sustainable systems (R. J. Johnson)

***26-015 cg**
Molecular characterization of shoot induction competence events in *Populus deltoides* (S. G. Ernst)

26-016 st
Integrated pest management – vertebrates in Nebraska (S. E. Hygnstrom)

26-017 ha
Water quality and water quantity criteria for Nebraska fishes (E. J. Peters)

26-018 rr
Avian species in diverted farmland (J. A. Savidge)

26-019 ha
Primary water quality determinants of attached algal communities in Nebraska (K. D. Hoagland)

26-020 ha
Evaluation of environmental factors and fish species for aquaculture development in Nebraska (T. B. Kayes)

26-021 ms
Molecular mechanisms associated with cellular homeostasis and differentiation in plants (S. G. Ernst)

26-022 st
Wildlife and sustainable agroecosystems (R. M. Case)

Horticulture

20-036 ha
Genetics, breeding and cultural interactions of dry edible beans (*Phaseolus vulgaris* L.) (D. P. Coyne, J. R. Steadman, A. K. Vidaver, D. S. Nuland)

20-040 rr
Genetic improvement of beans (*Phaseolus vulgaris* L.) 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. Pappozzi)

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

20-051 ha
Physiology and development of turfgrasses for low resource requiring environments (G. L. Horst)

20-052 ha
Introduce and develop high value crops from hardy wood plant germplasm for the North Central Region (W. A. Gustafson, Jr.)

20-053 ha
Breeding and development of buffalograss and other low maintenance species for central Great Plains (T. P. Riordan)

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

Plant Pathology

21-012 st
Electron microscopy in agricultural research (W. G. Langenberg, E. M. Ball)

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

21-039 rr
Reduction of corn losses caused by nematodes in the North Central Region (T. O. Powers, E. D. Kerr)

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)

21-042 ha
Characterization and genetics of bacterial plant pathogens and endophytic bacteria (A. K. Vidaver)

21-043 ha
Detection and properties of plant viruses of Nebraska (L. C. Lane)

21-044 ha
Biological control of soil-borne diseases of dry bean and turfgrass with antagonistic bacteria (G. Y. Yuen)

21-046 ha
Host-parasite interactions between fungal pathogens and their hosts (J. E. Partridge)

21-047 st
Development of vectors and their use in plant transformation and plant gene regulation studies (A. Mitra)

21-048 ha
Investigations of management strategies for control of rusts, leaf spots, and blights of winter wheat and turfgrass (J. E. Watkins)

21-049 ha
Epidemiology of diseases of dry edible beans and other vegetables in Nebraska (J. R. Steadman)

21-050 sg
Genetic engineering of crop plants to sclerotinia resistance (A. Mitra, M. B. Dickman)

21-051 cg
Enhanced nematode diagnostics by polymerase chain reaction (T. O. Powers)

21-052 cg
Fungal zoospore mediated transfer of foreign DNA into plants (A. Mitra, W. Langenberg)

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)

21-055 st
Avirulence gene D from pseudomonas in a suicide gene (J. E. Partridge)

Veterinary and Biomedical Sciences

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

14-014 rr
Bovine respiratory disease (M. B. Rhodes)

14-039 st
Nebraska SPF swine laboratory (J. A. Schmitz, A. Hogg)

***14-044 sg**
Bovine respiratory syncytial virus subunit vaccine, immunity, and rapid diagnosis (C. L. Kelling)

***14-049 ah**
Molecular characterization of virus-host cell receptor interactions (S. Srikumaran)

14-054 rr
Research in support of a national eradication program for pseudorabies (F. A. Osorio, A. Hogg)

14-055 ah
Pathogenesis of diseases due to bovine viral diarrhoea virus infections in cattle (C. L. Kelling, R. O. Donis, G. E. Duhamel, M. B. Rhodes, S. Srikumaran)

14-058 ah
Molecular characterization of bovine viral diarrhoea virus and its interaction with the host (R. O. Donis)

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. Groteleuschen)

14-060 sg
Molecular characterization of bovine herpes virus 1-host cell receptor interactions (S. Srikumaran, C. J. Jones, R. J. Krueger)

***14-062 sg**
Integrated management practices for control of swine dysentery and salmonellosis (G. E. Duhamel, G. R. Bodman)

14-063 cg
Modulation of latent pseudorabies virus infections by vaccines: a quantitative analysis (F. A. Osorio, C. Jones)

14-064 st
Development and evaluation of a parturition detection device (G. P. Rupp)

14-065 sg
Is the latency related gene of BHV-1 necessary for latent infection of cattle (C. Jones, F. A. Osorio)

14-066 ha
Functional analysis of the BHV-1 latency related gene (C. Jones)

14-067 st
Evaluation and modulation of bovine immune function (L. J. Perino)

***14-068 ha**
Molecular analysis of the bovine immune system: dissection of mammary gland T cell repertoire as the model system (S. S. A. Chen)

14-069 ha
Regulation of expression of the receptor for follicle-stimulating hormone (FSH) in cattle (D. L. Hamernik)



"I'm firmly convinced of the benefits of shelterbelts and I would like to be able to find some way to help other people see the value of these resources. I get frustrated when I see us squandering what we have without any concern about what tomorrow brings. We tend to think about today, seldom about tomorrow and never, ever about next week."

– Jim Brandle
shelterbelt ecologist

14-070 cg
Regulation of bovine herpes virus 1 transcription during latent infection (C. Jones)

14-071 cg
Site-directed mutagenesis of the p125 polypeptide of bovine viral diarrhea virus (R. O. Donis)

14-072 rr
Reproductive performance in domestic ruminants (D. L. Hamernik)

14-074 cg
Molecular cloning and characterization of the cellular receptor for bovine herpes virus 1 (S. Srikumaran, C. J. Jones, S. R. Thaker)

14-075 cg
Regulation expression of the GnRH gene in ruminants (D. L. Hamernik)

14-076 ah
Molecular analysis of the bovine immune system: dissection of mammary gland T cell repertoire (S. S. A. Chen)

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)

Human Resources and Family Sciences Departments

Family and Consumer Sciences

92-015 ha
Understanding problems and possibilities of independent living for the rural elderly (E. R. Combs)

92-016 rr
Rural households at risk of serious housing problems in the North Central Region (E. R. Combs)

92-017 ha
Factors influencing older consumers' experience and satisfaction with health insurance (K. Prochaska-Cue)

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)

93-023 ha
The social and psychological aftermath of serious motor vehicle accidents (J. DeFrain)

93-024 ha
Nebraska's youth at risk, assessing the problem (J. C. Woodward)

93-025 ha
The influence of volunteer companion programs on self-competence and family relationships of children (D. A. Abbott, W. H. Meredith)

93-026 ha
Assessing change in rural head start families (P. Zeece)

93-027 ha
Coping and adaptation among Nebraska's farm/ranch and rural families during periods of transitions (C. W. Smith)

Nutritional Science and Dietetics

91-020 rr
Nutrient bioavailability – a key to human nutrition (C. V. Kies, J. Driskell)

91-025 rr
Health maintenance aspects of dietary recommendations designed to modify lipid metabolism (C. V. Kies, N. Lewis)

91-032 ha
Assessment of vitamin B-6 requirements of adults (J. A. Driskell)

91-033 ha
Nutrient composition of meats and vegetables as consumed (J. A. Driskell, J. Albrecht, F. Hamouz, N. Lewis, M. Schnepf)

91-034 ha
Nutrition problems of older adults in Nebraska and methods of changing food behavior (N. M. Betts)

91-035 ha
Nutrition status and family history of chronic disease in young Nebraska women (N. M. Lewis)

91-036 ha
Consumption and nutrient content and retention of vegetables and their health implications (J. A. Albrecht)

91-037 rr
Behavioral and health factors that influence the food consumption of young adults (N. M. Betts)

91-038 ha
The use of natural antioxidants to control warmed-over flavor in meats (M. Schnepf)

91-039 ha
Nutrient intake, eating behaviors, and anthropometric measurements of young children in Nebraska (K. Stanek)

91-040 st
Antioxidant incorporation in edible films for maintaining meat quality (M. Schnepf, F. Hamouz, S. L. Cuppett, R. W. Mandigo)

91-041 ha
Meat cookery and quality concepts for the food service industry (F. Hamouz)

Textiles, Clothing and Design

94-017 rr
Rural retailing: impact of change on consumer and community (R. C. Kean)

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

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

Off-Campus Research Centers

Northeast Research and Extension Center

42-007 ha
Feedlot management and production considerations for the cattle feeder (T. L. Mader, R. A. Britton, H. D. Jose)

42-010 ha
Improving feeder pig performance (M. C. Brumm)

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

42-015 ha
Interpretation of swine enterprise records for increased understanding of profitability relationships (T. A. Powell)

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)

42-019 ha
Increasing fertilizer use efficiency in northeast Nebraska (C. A. Shapiro)

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

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. Weichenthal)

***44-036 ha**
Control of *Heterodera schachtii* and *Cercospora beticola* on sugar beet in the Nebraska Panhandle (E. D. Kerr)

44-040 ha
Influence of grazing frequency and date on Nebraska Sandhills vegetation (P. E. Reece, J. T. Nichols)

44-041 ha
Studies of perennial grass tiller, rhizome, and root dynamics designed to develop grazing management strategies (P. E. Reece)

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

44-043 ha
Development of integrated pest management systems for major insect pests of crops in the Nebraska Panhandle (G. L. Hein)

44-044 ha
Sugar beet planters – plant spacing and emergence performance (J. A. Smith, C. D. Yonts, S. D. Kachman)

44-045 ha
Resource efficient dryland cropping systems for western Nebraska (D. J. Lyon)

44-046 ha
Nutrient management of irrigated and dryland crops in western Nebraska (G. D. Binford)

44-047 cg
Wheat curl mite population dynamics and epidemiology of wheat streak mosaic (G. L. Hein, R. C. French, D. J. Lyon, J. E. Watkins)

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)

46-010 rr
Increased efficiency of lamb production (K. A. Leymaster, L. D. Young, G. E. Dickerson, R. M. Koch)

46-012 rr
The genetics of body composition in beef cattle (R. M. Koch, L. V. Cundiff)

South Central Research and Extension Center

48-004 rr
Occurrence of mycotoxins in feeds and the implications to animal and human health (B. L. Doupnik, Jr.)

48-016 ha
Soybean production practices and alternative crops within resource-efficient cropping systems for south central Nebraska (R. W. Elmore)

48-017 st
Investigations on the epidemiology and control of maize chlorotic mottle virus (B. Doupnik, Jr., R. J. Wright, L. J. Meinke, S. Jensen, L. Lane, D. Wysong)

48-018 ha
Blocked and open end furrow irrigation system management (J. Cahoon)

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)

West Central Research and Extension Center

43-024 ha
Biology, ecology, economics and control of major insects affecting livestock (bovine) in Nebraska (J. B. Campbell)

43-033 rr
Bionomics, vector capabilities and management strategies for face flies (J. B. Campbell)

43-042 ha
Sorghum and corn breeding and corn, sorghum, and wheat variety evaluation under central Nebraska environment conditions (P. T. Nordquist)

***43-045 ha**
Profitability and income variability of cropping and range cattle production systems (R. T. Clark)

***43-046 sg**
Beef/range systems – integrating management practices to improve efficiency (D. D. Dearborn)

43-047 ha
Selection and development of native herbaceous landscape plants (D. T. Lindgren)

***43-048 sg**
Parasite manipulation to control flies in confined livestock operations (J. B. Campbell)

43-049 ha
Increasing fertilizer nitrogen use efficiency in west central Nebraska (G. W. Hergert)

43-050 ha
Beef nutrition and production systems for Sandhills rangeland (D. C. Adams)

43-051 sg
Quantifying nitrate leaching under continuous corn versus a corn-soybean rotation (G. W. Hergert, N. L. Klocke)

43-052 ha
Quantifying year-around leaching losses in structured soil with percolation lysimeters (N. L. Klocke)

43-054 ha
Evaluation of management practices to improve reproductive efficiency of beef heifers (G. H. Deutscher, D. C. Adams)

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)

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)

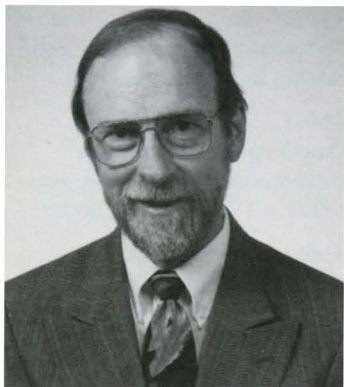
Agricultural Research and Development Center

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

Center for Sustainable Agriculture Systems

31-001 sg
Integrated crop/livestock research for sustainable systems in Nebraska (C. A. Francis)

31-002 st
Center for Sustainable Agricultural Systems (C. A. Francis)



"Science is really a way of making sense out of the world."

– Marion O'Leary
director
Center for Biological
Chemistry

Food Processing Center

19-002 sg
Development and quality/safety enhancement of specialty food products (S. L. Taylor, D. Neumeister)

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

Industrial Agricultural Products Center

29-001 sg
Nonfood agricultural products project (M. A. Hanna)

29-002 sg
Investigating milkweed as an alternative source of fiber (M. A. Hanna)

29-003 cg
Reactive processing for starch grafts (M. A. Hanna)

Water Center/ Environmental Programs

25-003 sg
Participation in the national agricultural pesticide impact assessment program (S. T. Kamble)

30-001 sg
Management of irrigated corn and soybeans to minimize groundwater contamination (D. G. Watts, R. F. Spalding)

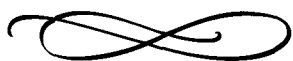
30-002 sg
Sprinkler irrigation as a remedial technique for VOC-contaminated groundwater (R. F. Spalding)



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 approximately 150 different scientific journals during 1993. Faculty also have written books, edited books or contributed book 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, theses and dissertations are listed for calendar year 1993.



Journals in which faculty have published in 1993

Agricultural Economics

Agribusiness: An International Journal
Agriculture and Human Values
Agriculture Finance Review
American Journal of Agricultural Economics
Applied Economics
Creighton Law Review
Economic Development Review
Journal of Agricultural Cooperation
Journal of Agricultural and Environmental Ethics
Journal of Community Development
Journal of Consumer Studies
Journal of Production Agriculture
Review of Agricultural Economics
Society of Automotive Engineers
Transactions of the American Society of Agricultural Engineers

Agricultural Meteorology

Agronomy Journal
Boundary-Layer Meteorology
Climatic Change
Field Crops Research
Finnish Peatland Society
Hydro-Review
Journal of Geophysical Research, Atmospheres
Remote Sensing of Environment

Agronomy

Agricultural Sciences
Agronomy Journal
Annual Review Plant Breeding
Biochemistry Genetics
Cereal Chemistry
Communications in Soil and Plant Analysis
Crop Science
Ecological Modelling
Environmental Pollution
Fertilizer Research
Great Plains Research
Ground Water
Journal of Animal Science
Journal of Cereal Science
Journal of Environmental Quality
Journal of Geophysical Research, Atmospheres
Journal of Hydrology
Journal of Plant Nutrition
Journal of Production Agriculture
Journal of Range Management
Journal of Soil and Water Conservation
Soil Science Society of America Journal
Transactions of the Nebraska Academy of Sciences
Trends in Agricultural Sciences
Tropical Agriculture
Water Resource Research
Water Science and Technology
Waste Management and Research
Weed Science
Weed Technology

Animal Science

Animal Feed Science and Technology
Biology of Reproduction
Comparative Biochemistry and Physiology
Journal of Animal Science
Journal of Dairy Science
Journal of Food Science
Journal of Muscle Foods
Journal of Production Agriculture
Journal of Reproduction and Fertility
Nutrition Research
Poultry Science
Review of Agricultural Economics
Theoretical and Applied Genetics

Biochemistry

Analytical Biochemistry
Archives of Biochemistry and Biophysics
Biochemistry
Current Opinion in Structural Biology
Journal of American Chemical Society
Journal of Bacteriology
Journal of Biological Chemistry
FEMS Letters
Molecular Microbiology
National Academy of Sciences
Plant Cell Physiology
Plant Physiology
Proceedings of the National Academy of Science
Protein Expression and Purification

Biological Systems Engineering

American Society of Agricultural Engineers
Applied Engineering in Agriculture
Agricultural Water Management
Agricultural Mechanization in Asia, Africa and Latin America
Cereal Foods World
Cereal Chemistry
Computers and Electronics in Agriculture
Indian Food Industry
Irrigation Science
Journal of Agricultural and Food Chemistry
Journal of Hydrology
Journal of Production Agriculture
Transactions of the American Society of Agricultural Engineers

Biometry

Agricultural Water Management
Agronomy Journal
Cereal Chemistry
Environmental Entomology
Journal of Animal Science
Journal of the Lepidopterists' Society
Journal of Multivariate Analysis
Population Ecology
Theoretical and Applied Genetics
Transactions of the American Society of Agricultural Engineers
Wilson Bulletin

Entomology

Agriculture, Ecosystems and Environment
Agronomy Journal
American Entomologist
Archives of Insect Biochemistry and Physiology
Biological Control
Bulletin of Environmental Contamination and Toxicology
Comparative Biochemistry and Physiology
Environmental Entomology
Environmental Toxicology and Chemistry
Insect Biochemistry and Molecular Biology
Journal of Agricultural Entomology
Journal of Economic Entomology
Journal of Entomological Science
Journal of Invertebrate Pathology
Journal of the Lepidopterists' Society
Journal of the Kansas Entomological Society
Pesticide Biochemistry and Physiology

Food Science and Technology

Cereal Chemistry
Cereal Foods World
Clinical Experimental Allergy
Indian Food Industry
Journal of Agricultural and Food Chemistry
Journal of American Oil Chemists Society
Journal of Dairy Science
Journal of Food Protection
Journal of Food Science
Separation Science Technology
Starch/Starke
Transactions of the American Society of Agricultural Engineers

Forestry, Fisheries and Wildlife

Environmental Entomology
Environmental Toxicology and Chemistry
Journal of Field Ornithology
Journal of Phycology
The Prairie Naturalist
Wilson Bulletin

Horticulture

Euphytica
HortScience
Journal of International Turfgrass Society Research
Journal of the American Society for Horticultural Science
Journal of Natural Resources and Life Sciences Education
Plant Cell, Tissue and Organ Culture

Plant Pathology

Archives of Virology
FEMS Letters
Gene
HortScience
Intervirology
Infection and Immunity
Journal of Bacteriology
Journal of Nematology
Journal of Structural Biology
Molecular and General Genetics
Mycologia
Plant Disease
Proceedings of the National Academy of Science
Virology

Veterinary and Biomedical Sciences

Agricultural Practice
American Journal of Veterinary Research
Avian Pathology
Biology of Reproduction
DNA and Cell Biology
Experimental Cellular Research
Experimental Parasitology
Journal of the American Veterinary Medical Association
Journal of Clinical Microbiology
Journal of General Virology
Journal of Veterinary Diagnostic Investigation
Infection and Immunity
Science
The Compendium of Continuing Education
Veterinary Medicine
Veterinary Microbiology
Veterinary Pathology

College of Human Resources and Family Sciences

Family and Consumer Sciences

Adolescence
Financial Counseling and Planning
Housing and Society
International Journal of Sociology of the Family
Journal of Family Violence
Journal of Gambling Studies
Journal of Home Economics
Journal of Sociology of the Family
Journal of Women and Aging
School Psychology International

Nutritional Science and Dietetics

Journal of Applied Nutrition
Journal of Food Protection
Journal of Food Quality
Journal of Nutrition Education
Plant Foods for Human Nutrition

Textiles, Clothing and Design

Journal of Women and Aging
Review of Environmental Contamination and Toxicology
Textile Chemist and Colorists
Uncoverings

Off-Campus Research Centers

Northeast Research and Extension Center

Agronomy Journal
Agricultural Water Management
Animal Feed Science Technology
Bulletin of Environmental Contamination and Toxicology
Computers and Electronics in Agriculture
Environmental Contamination
Journal of Soil Science Society
Journal of Animal Science
Journal of Economic Entomology
Review of Agricultural Economics
Soil Science Society of America Journal

Panhandle Research and Extension Center

Agricultural Practice
American Potato Journal
Association of Potato Research
Crop Science
Journal of Natural Resources and Life Science Education
Journal of Production Agriculture
Journal of Sugar Beet Research
Weed Technology
Weed Science

South Central Research and Extension Center

Agricultural Water Management
Crop Science
Journal of Economic Entomology
Journal of Kansas Entomological Society
Plant Disease

West Central Research and Extension Center

Agricultural Practice
Agriculture Water Management
Environmental Entomology
HortScience
Journal of Economic Entomology
Journal of Kansas Entomological Society
Journal of Production Agriculture
Plant Protection Quarterly
Transactions of the American Society of Agricultural Engineers
Weed Science

Interdisciplinary Activities

Water Center/Environmental Programs

Bulletin of Environmental Contamination and Toxicology
Journal of Economic Entomology
Journal of Environmental Entomology

Research Publications (1993)

Agricultural Economics

Journal Articles

- Aiken, J.D. 1993.
Protecting the hidden resource: the quiet crisis in Nebraska pesticide and groundwater protection policies. *Creighton Law Review* 26:639-696. (J. Series No. 10215)
- Allen, J.C. 1993.
Development in a community under stress. *Journal of Community Development* 28:154-166. (J. Series No. 9986)
- Allen, J., B. Johnson, and L. Leistriz. 1993.
Rural economic development using information age technology. *Economic Development Review* 2:30-33. (J. Series No. 10346)
- Azzam, A. and T.A. Park. 1993.
Testing for switching market conduct. *Applied Economics* 25:795-801. (J. Series No. 10129)
- Azzam, A., K. Steigert, and W. Brorsen. 1993.
Markdown pricing and cattle supply in the beef packing industry. *American Journal of Agricultural Economics* 75:549-558. (J. Series No. 9772)
- Azzam, S., A. Azzam, and T. Guest. 1993.
A probability model of aggregate meat consumption in the United States. *Journal of Consumer Studies* 17:355-365. (J. Series No. 10403)
- Conley, D.M. and D. Simon. 1993.
Demand models for U.S. sales of new agricultural tractors. *Society of Automotive Engineers. Technical Paper Series* 932471. (J. Series No. 10291)
- Hergert, G.W., N.L. Klocke, J.L. Petersen, P.T. Nordquist, R.T. Clark, and G.A. Wicks. 1993.
Cropping systems for stretching limited irrigation supplies in the central Great Plains. *Journal of Production Agriculture* 6:520-521. (J. Series No. 10256)

- Jose, H.D. and J.A. Crumly. 1993.
Psychological type of farm/ranch operators: relationship to financial measures. *Review of Agricultural Economics* 15:121-132. (J. Series No. 9063)

- Kotschwar, L., D. Simon, and E.W.F. Peterson. 1993.
Laws governing the use of technical standards as barriers to trade: the case of trade in livestock products. *Agribusiness: An International Journal* 9:91-101. (J. Series No. 9995)

- Peterson, E.W.F. 1993.
Time preference, the environment and the interests of future generations. *Journal of Agricultural and Environmental Ethics* 6:107-126. (J. Series No. 10139)

- Peterson, E.W.F., J.D. Aiken, and B.B. Johnson. 1993.
Property rights and groundwater in Nebraska. *Agriculture and Human Values* 4:41-49. (J. Series No. 9996)

- Powell, T.A., M.C. Brumm, and R.E. Massey. 1993.
Economics of space allocation for grower-finisher hogs: a simulation approach. *Review of Agricultural Economics* 15:133-141. (J. Series No. 9736)

- Royer, J.S. 1993.
Patronage refunds, equity retirement, and growth in farmer cooperatives. *Agricultural Finance Review* 53:43-55. (J. Series No. 9648)

- Royer, J.S. and S. Bhuyan. 1993.
Formula price contracts as an alternative to forward integration by farmer cooperatives. *Journal of Agricultural Cooperation* 8:28-38. (J. Series No. 10189)

- Wilmes, G.J., D.L. Martin, and R.J. Supalla. 1993.
Decision support system for design of center pivots. *Transactions of the American Society of Agricultural Engineers* 37:165-175. (J. Series No. 10277)

Research Bulletins

- Coady, S.A. and R.T. Clark. 1993.
Ranch management practices in the Sandhills of Nebraska: managing production. *Research Bulletin* 318. University of Nebraska Agricultural Research Division.

- Peterson, E.W.F. and S. Mohanty. 1993.
Agricultural policy reform in the European Community: implications for markets for livestock feed ingredients. *Research Bulletin* 320-F. University of Nebraska Agricultural Research Division.

Book Chapters

- Aiken, J.D. 1993a.
Water policy fought out in the law: the evolution of Nebraska water law, p. 231-232. *In: Flat water: a History of Nebraska and its Water*, Resource Report No. 12, Conservation and Survey Division, IANR, University of Nebraska-Lincoln.

- Aiken, J.D. 1993b.
Instream appropriations in Nebraska, p. 16-1 to 16-7. *In: L.J. McDonald and T.A. Rice (eds.), Instream Flow Protection in the West*, University of Colorado Natural Resources Law Center, Boulder, CO.

- Frederick, A.L. 1993.
The future of Nebraska agriculture, p. 265-271. *In: Flat water: a History of Nebraska and its Water*, Resource Report No. 12, Conservation and Survey Division, IANR, University of Nebraska-Lincoln.

- Linsensmeyer, D.A. and D.M. Conley. 1993.
Market information, p. 275-301. *In: Grain Marketing*, 2nd ed., Westview Press, Boulder, CO.

M.S. Theses

- Chaudry, M.A. 1993.
Economics of cotton harvesting. (G.A. Helmers, Advisor)
- Rempe, J.E. 1993.
The implications of a North American free trade agreement for the Mexican corn, wheat and sorghum markets. (E.W.F. Peterson, Advisor)

Ph.D. Dissertation

- Kim, H.S. 1993.
Long-term hedging analysis for corn, soybeans and wheat. (D.M. Conley, Advisor)

Agricultural Leadership, Education and Communication

M.S. Theses

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"I became a researcher to touch the future. That's what research is about."

**— Ellen Paparozzi
horticulturist**

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"Research cannot only solve today's problems, it can define tomorrow's opportunities."

**— Steve Waller
assistant dean and
director
Agricultural Research
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Northup, K.B. 1993.

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"To me, families are sacred. My work is almost like a religious quest to find out what makes families work well and to help them through the hard times in life. It is really a wonderful way to invest your life."

**— John DeFrain
family sciences
researcher**

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"It's important that we view Nebraska as part of the global community. We can learn a lot from other parts of the world. ... Whenever I travel I learn something, whether it was positive or negative. I bring the knowledge back to Nebraska to help the state."

— Don Wilhite
director
International Drought
Information Center

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"The basic research I do is very much accountable. It has a clear objective. I've always known what the goal was. We want to keep our Nebraska growers, as well as American growers, as competitive as possible."

**– Steve Baenziger
wheat breeder**

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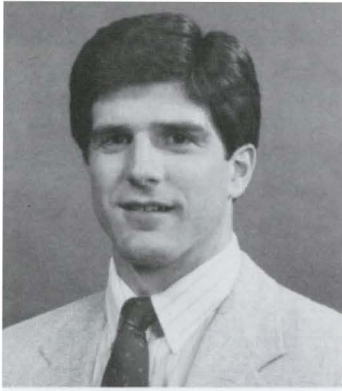
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— George Graef
soybean breeder

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"When I was in college I was supposed to write a paper. My professor suggested I write about viruses and gave me a book, 'Molecular Biology of Tumor Viruses'. After that I was hooked. ... I think our research has implications not only for the cattle industry but for human health. I hope our work will eventually contribute to designing better anti-viral therapies."

— Clinton Jones
veterinary scientist

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Ph.D. Dissertations

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Zhang, H. 1993.

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Ph.D. Dissertation

Yang, G. 1993

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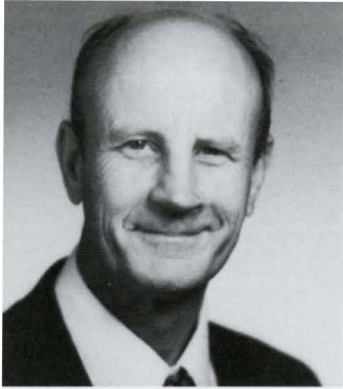
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Ropp, S. L. 1993.

Two projects in the *Chlorella* virus system: I. M.CVIBIII-M.CVIRI Adenine methyltransferase gene fusions, II. Cloning and sequencing of an Ankyrin-like gene in PBCV-1. (J. L. Van Etten, Advisor)



"I think the philosophy of research is transferred across the generations. You must constantly remind students that it's an adventure, it's a process of exploration and they need to use as much imagination as they possibly can. They can't have tunnel vision but must stand back and look at things and see where new opportunities are."

— Dermot Coyne
dry bean/vegetable
breeder

Ph.D. Dissertations

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Hesse, R. 1993. Porcine rotaviruses: Studies in vaccine development, genetic reassortment, and monoclonal antibodies. (E. Dickinson, Advisor)

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Journal Articles

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"I'm confident that we've proved yield responses in soybeans are directly related to light interception and that the major impact of insect feeding is to change plants' effectiveness in intercepting light. ... If we can find some way to express this notion of intercepted light, we can make incredibly accurate predictions about yield losses at different levels of defoliation. ... By having a more accurate measure, we're not only going to save farmers money, we'll definitely reduce reliance on pesticides. It's better economically and it's better environmentally."

– Leon Higley
entomologist/plant
physiologist

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Handley, D.V. 1993.

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Hanson, C.K. 1993.

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Pierce, D.D. 1993.

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Wei, L.H. 1993.

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Ph.D. Dissertations

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Chu, F.L. 1993.

Protein quality and acceptability of animal and soybean products. (C. Kies, Advisor)

Joo, S.J. 1993.

Chocolate and chocolate-like products: impact on copper and lipid status of humans and mice and consumption patterns of chocolate foods in the U.S.A. (C. Kies, Advisor)

Kang, Y.H. 1993.

Soybean oil, canola oil, palm oil, and other dietary oil: comparative effects on lipid metabolism and nutrition knowledge and attitudes. (C. Kies, Advisor)

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Northeast Research and Extension Center

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Panhandle Research and Extension Center

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M.S. Thesis

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South Central Research and Extension Center

Journal Articles

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Cahoon, J.E., W.L. Kranz, N.L. Klocke, and L. Young. 1993.

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"We want to identify practices farmers could adopt and be just as well off economically as they were before but contribute to environmental quality as well. I think those options are out there. ... Eventually we'll be able to do public policy planning around the economics of water quality. We'll balance the costs with environmental benefits and quantify it to make sure the choices are economically and environmentally sound."

— Ray Supalla
agricultural economist

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Southeast Research and Extension Center

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West Central Research and Extension Center

Journal Articles

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Predators and parasitoids of house flies and stable flies (Diptera: Muscidae) in cattle confinements in west central Nebraska. *Environmental Entomology*. 22:212-219. (J. Series No. 9965)

Skoda, S.R., G.D. Thomas, and J.B. Campbell. 1993.

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Coady, Sean and Richard T. Clark. 1993.

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Ph.D. Dissertation

- Villalobos, G. 1993.
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On-Campus Research Center

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- Flowerday, C.A. and R.D. Kuzelka. 1993.
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M.S. Thesis

- Eckert, M.T. 1993.
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Research Expenditures

Report of Research Expenditures The University of Nebraska Agricultural Research Division July 1, 1993 through June 30, 1994

ARD receives funding from federal formula funds, industry grants, federal grants and state appropriations.

During fiscal year 1993-1994, faculty with ARD appointments obtained grant and contract funds that totaled \$23,634,662. This amount represents 31 percent of all grant and contract funds received by UNL and 47 percent of all research funds obtained by UNL faculty. The extramural funds coming to ARD faculty to address problems of importance to Nebraska have a significant direct impact on the state's economy.

Federal Formula Funds:

Hatch Formula	\$2,209,273
Regional Research	\$ 878,903
McIntire-Stennis	\$ 164,899
Animal Health	\$ 222,690
Total Federal Formula Funds	\$ 3,475,765

State Appropriated Funds \$24,075,839¹

Contracts and Grants:

USDA Coop Agreements	\$2,364,752
USDA Special & Competitive	\$2,480,596
Federal Grants -	
(NSF, NIH, HEW, AID)	\$4,251,990 ²
Industry Grants	\$4,340,714
Total Grants and Contracts	\$13,438,052
Sub-Total	\$40,989,656

Product Sales \$ 7,169,775

Total Expenditures \$48,159,431

¹Includes \$2,594,184 of Nebraska Research Initiative funds expended by ARD affiliated units.
²\$211,000 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 1994

Expenditure Category	State Appropriated and Hatch Funds	Federal Grants	Industry Grants	Product Sales (Revolving Funds)	All Funds
<i>percent of total within source</i>					
Salaries, Wages and Benefits					
Faculty/Administrative	39.7	4.3	3.9	0.6	23.3
Managerial/Professional	11.1	9.4	6.3	4.1	9.2
Office/Service	13.2	12.1	11.2	17.3	13.4
Hourly Wages	0.7	6.3	9.9	3.8	3.2
GRA Stipends	6.1	17.4	18.8	0.9	8.8
Benefits	<u>14.1</u>	<u>9.0</u>	<u>8.1</u>	<u>5.9</u>	<u>11.2</u>
Subtotal:	84.9	58.6	58.1	32.6	69.1
Operating					
Supplies and Expenses	10.8	31.3	18.2	56.7	22.4
Travel	0.9	4.6	14.6	2.2	3.3
Equipment	<u>3.4</u>	<u>5.5</u>	<u>9.1</u>	<u>8.6</u>	<u>5.2</u>
Subtotal:	15.1	41.4	41.9	67.4	30.9
Total:	100.0	100.0	100.0	100.0	100.0

Agricultural Research Division Selected Research Program Information

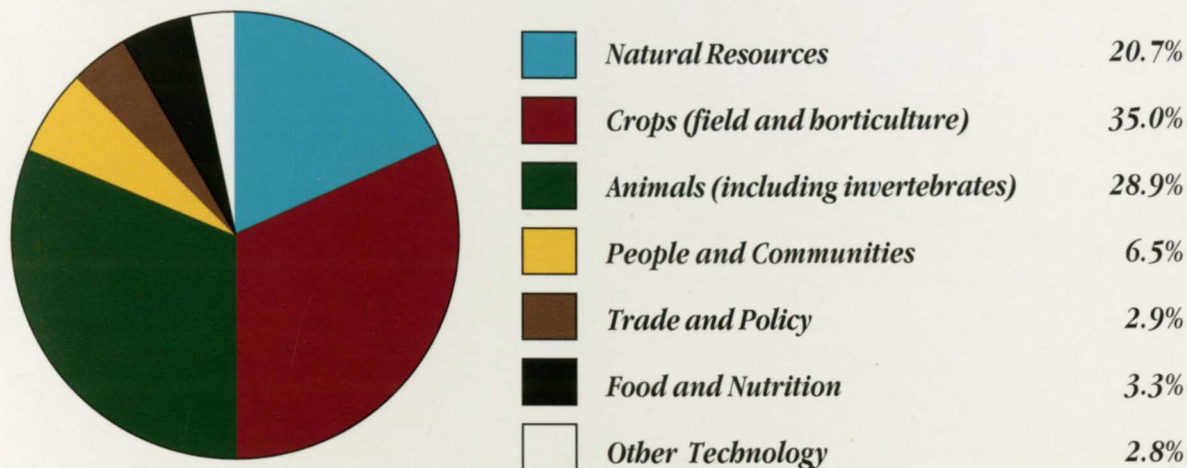
Category	FY 1992	FY 1993	FY 1994
Project Information:			
Projects at beginning of year	293	335	351
Projects terminating	29	40	24
Projects revised	5	14	8
New projects	71	56	35
Projects at the end of the year	335	351	362
Faculty full-time equivalents (FTE)	139.4	135.7	132.2
Support for budgeted research faculty:			
Federal formula and state approp./FTE ¹	\$192,087	\$205,607	\$208,408
Grant and contract expenditures/FTE	\$ 76,825	\$ 90,672	\$101,649
Product sale expenditures/FTE	\$ 46,317	\$ 41,914	\$ 54,234
Outputs from research program:²			
Refereed journal articles	272	277	306
Research bulletins	6	3	4
Books and book chapters	44	49	70
M.S. and Ph.D. theses	114	129	132
Cultivars and germplasm released	11	14	6
Patents obtained	3	0	3

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

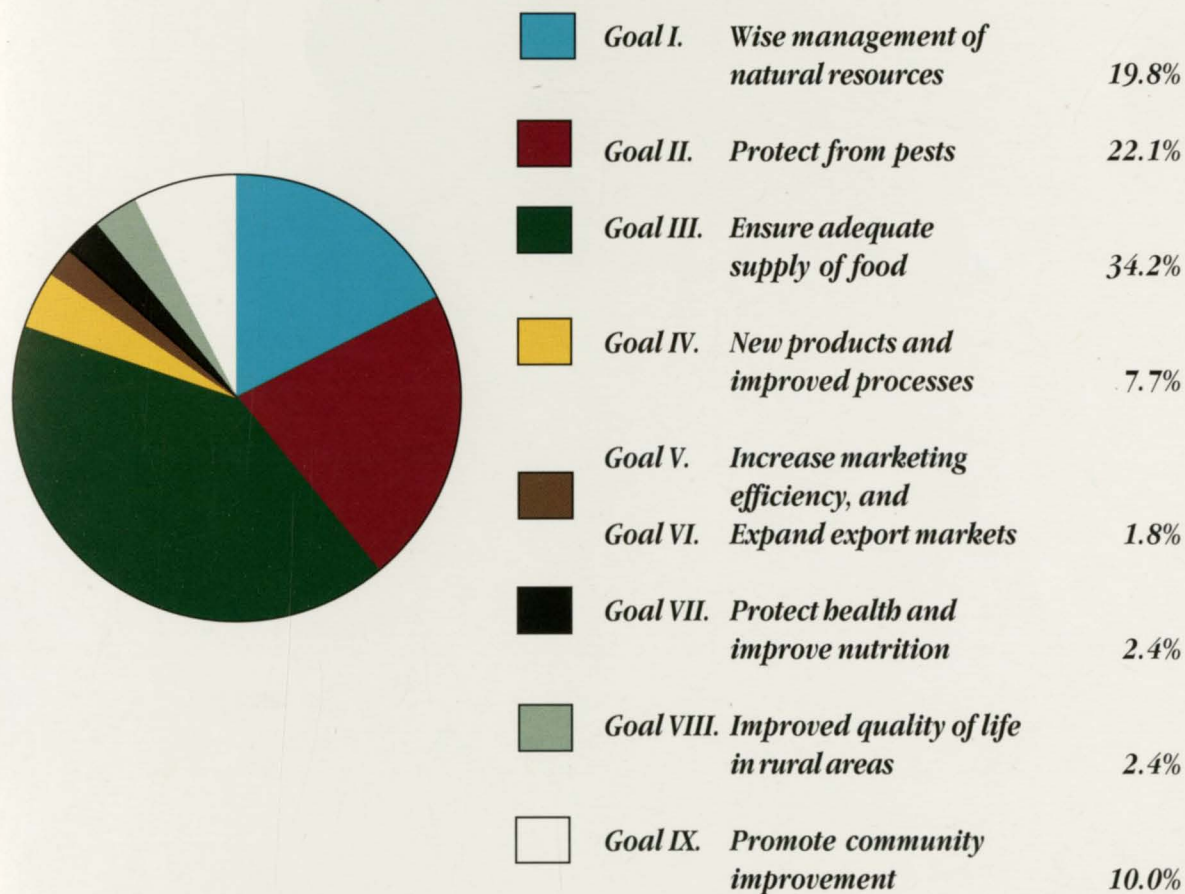
² A large number of abstracts, technical reports, and other non-refereed articles also are published by faculty each year.

Agricultural Research Division Programmatic Distribution of Investments – FY 1993¹

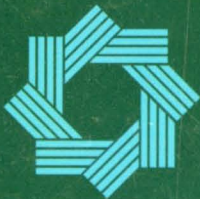
I. Classification by Research Program Area



II. Classification by Research Goal



¹Product sale income is not included in the totals.



*“In the fields of observation,
chance favors only the mind
that is prepared.”*

*Louis Pasteur
1822-1895*