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107th
Annual Report
Agricultural Research Division
1993



Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
July 1, 1992 to June 30, 1993



It is the policy of the University of Nebraska-Lincoln Institute of Agriculture and Natural Resources not to discriminate on the basis of sex, age, handicap, race, color, religion, marital status, veteran's status, national or ethnic origin or sexual orientation.



107th
Annual Report
Agricultural Research Division
1993



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Foreword

It is a pleasure to provide the 107th Annual Report of the UNL Agricultural Research Division (ARD). This report contains lists of current faculty; 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, 1992 to June 30, 1993.

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.

Our program has an excellent balance of projects providing new information or technologies relevant to current agricultural, environmental and human challenges, 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; some also teach in the College of Agricultural Sciences and Natural Resources or the College of Human Resources and Family Sciences, and some also serve as Extension Specialists with the Cooperative Extension Division.

As of June 30, 1993, 136 full-time equivalents in the ARD were distrib-

uted 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 351 research projects supported by ARD resources.

Continued investment in research is essential for maintaining and enhancing the long-term profitability and sustainability of Nebraska agriculture, and ensuring the competitiveness of our products in the global marketplace. Numerous studies have demonstrated that dollars invested in agricultural research return an average annual rate of 30 to 49 percent, which means investing \$1 in research yields at least \$4.90 in additional value of agricultural output over several years.

Through taxes, the average U.S. family spends \$17 annually supporting agricultural research. In return, they receive \$46 in benefits from lower food costs. The benefit-cost ratio is 2.7 to 1.

Low-income families benefit the most from agricultural research because they spend a greater proportion of their income on food. For families with a \$10,000 to \$15,000 annual income, the benefit-cost ratio is 11.6 to 1.

Agricultural research emphasizes solving people's real problems. 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

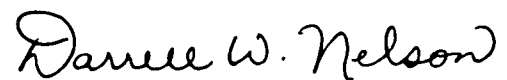
compatible with maintaining a quality environment and conserving natural resources, and enhancing rural communities and the quality of life for Nebraska families.

Agriculture and related industries employ about one-half of Nebraska's work force. Nebraska ranks fourth nationally in cash receipts for crops and livestock, with annual sales exceeding \$9 billion. The state ranks fifth nationally in the value of agricultural commodity exports, with nearly \$2.6 billion annually.

Results derived from various research 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.

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 underway 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. ARD's ultimate goal is bettering Nebraska's agriculture, environment, economic well-being and quality of life.



Darrell W. Nelson, Dean and Director
Agricultural Research Division



Administration

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 1993)

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 Wilson, Lincoln

Student Regents

UNK — Andy Stock
UNL — Keith Benes

UNMC — Pamela Kohlmeier
UNO — Jennifer Newhouse

Administrative Officers

Martin A. Massengale, President, University of Nebraska
Graham S. Spanier, Chancellor, University of Nebraska-Lincoln
Irvin T. Omtvedt, Vice Chancellor, Institute of Agriculture and
Natural Resources

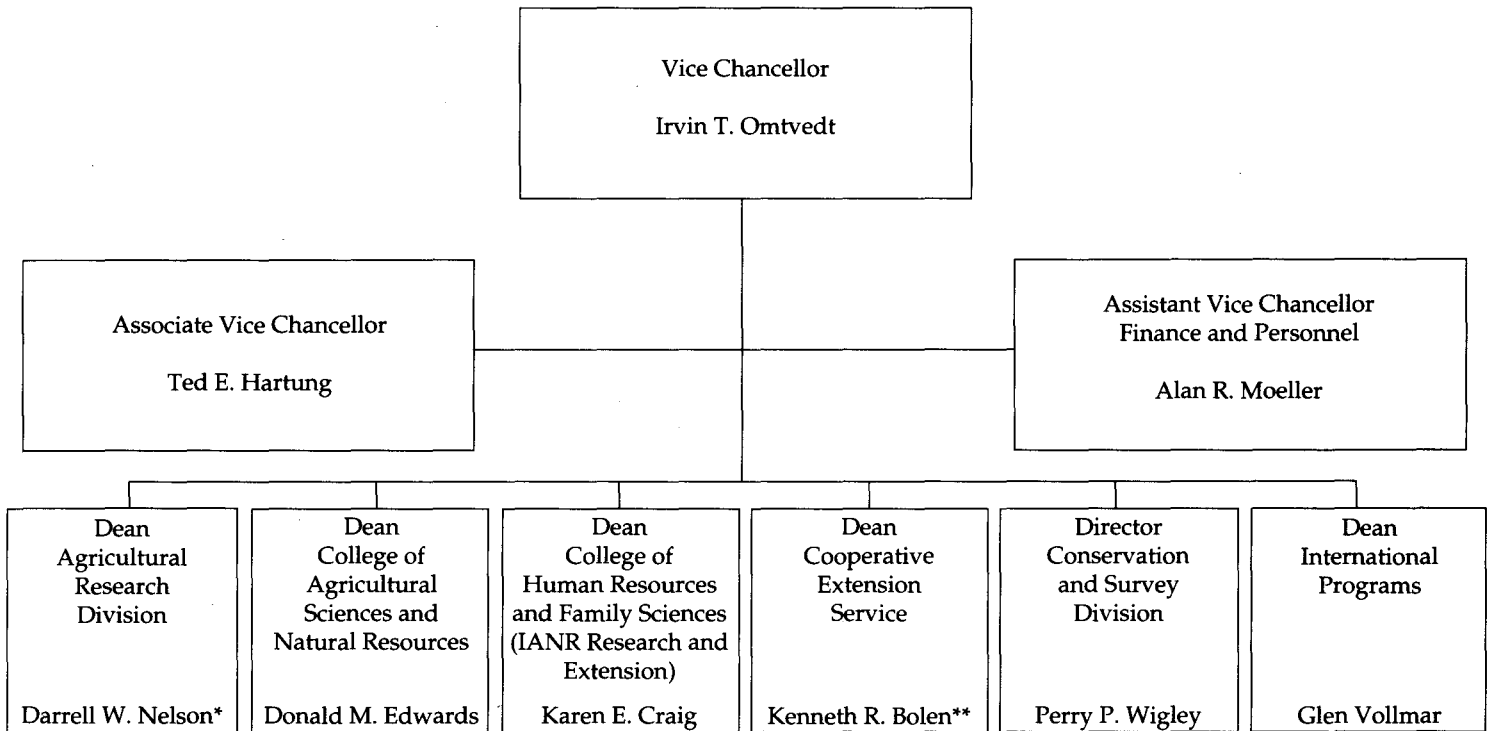
Agricultural Research Division

Darrell W. Nelson, Dean and Director
Dale H. Vanderholm, Associate Dean and Associate Director
Karen E. Craig, Assistant Director/College of Human
Resources and Family Sciences
Steven S. Waller, Assistant Dean/Assistant Director
Jeff Keown¹, Administrative Intern
Dora Dill, Staff Assistant
Diane Mohrhoff, Clerical Assistant III
Nelvie Lienemann, Staff Secretary III
Kathy Westwood, Staff Secretary III

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 1993

Agricultural/Natural Resources Departments

Agricultural Economics
Sam Cordes, Head

Agricultural Leadership, Education and Communication
Allen Blezek, Head

Agricultural Meteorology
Blaine Blad, Head

Agronomy
Robert Shearman, Head

Animal Science
Elton D. Aberle, Head

Biochemistry
Marion O'Leary, Head

Biological Systems Engineering
Glenn Hoffman, Head

Biometry
David Marx, Head

Entomology
John Foster, 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
John Schmitz, Head

College of Human Resources and Family Sciences

Family and Consumer Sciences
Kathy Prochaska-Cue¹, Interim Chair
Shirley Baugher², 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—Donald B. Hudman¹, Director
—Robert Fritschen², Director

Panhandle Research and Extension Center
Scottsbluff—Robert Fritschen¹, Director
—Burt Weichenthal², Interim 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—Del Dearborn¹, Interim Director
—Pete Jacoby², Director

Interdisciplinary Centers

Biotechnology Center
Don Weeks, Director

Food Processing Center
Steve Taylor, Director

Great Plains Regional Center for Global Environmental Change
Wm Easterling², Director

Industrial Agricultural Products Center
Milford Hanna, Director

International Trade Policy Center
Robert McGeorge, Director

Rural Community Revitalization/Development Center
Sam Cordes, Director

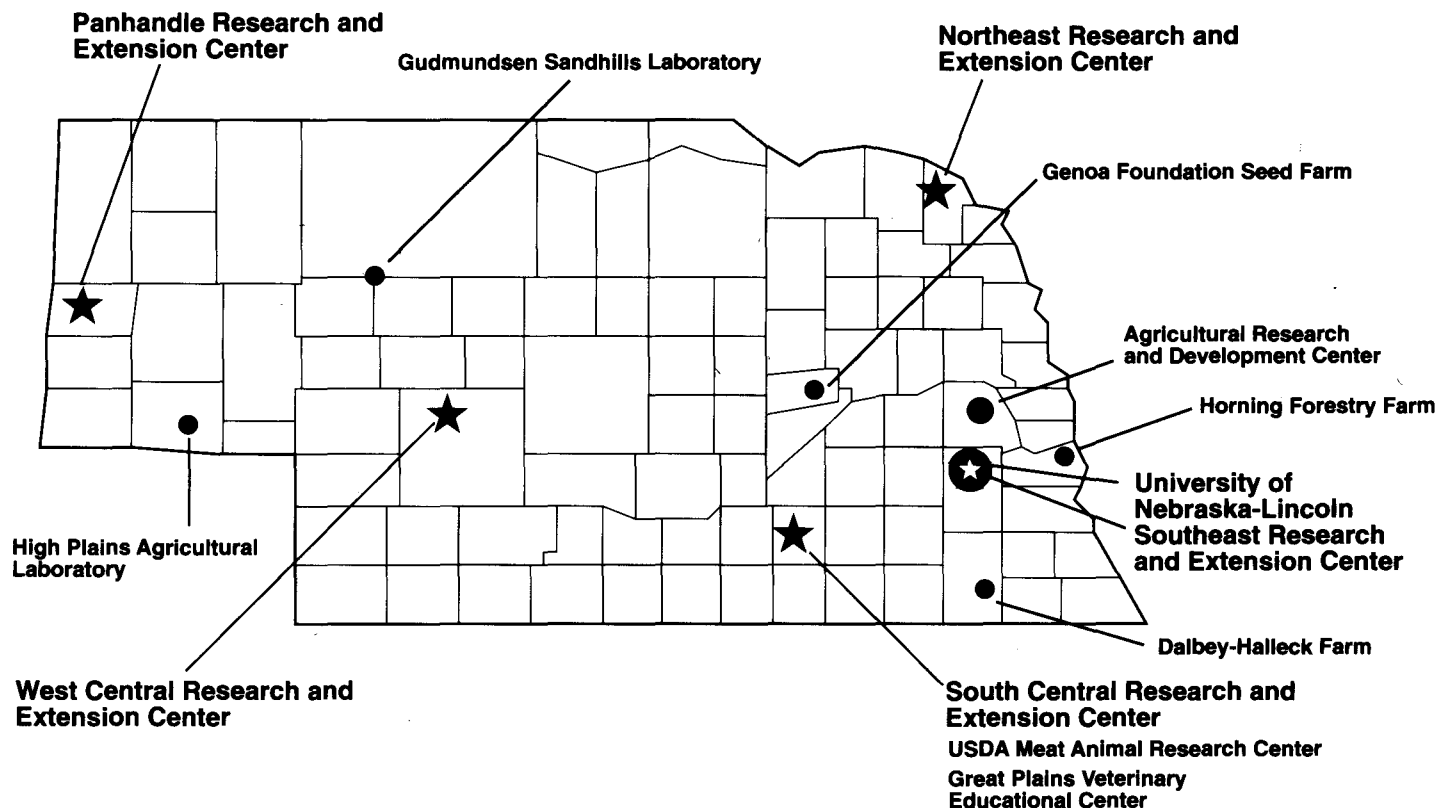
Sustainable Agricultural Systems Center
Chuck Francis, Director

Water Center/Environmental Programs
Bob Volk, Director

¹ Ended appointment during 1992-1993

² Began appointment during 1992-1993

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 USDA Meat Animal Research Center — Clay Center

Southeast Research and Extension Center — Lincoln

West Central Research and Extension Center — North Platte



Research Highlights

The Agricultural Research Division provides leadership for research addressing problems and opportunities in agriculture, food, natural resources and human resources and family sciences. Fundamental and applied research provides solutions to priority problems facing Nebraska's agriculture and food industries, develops information essential for managing our natural resources and maintaining environmental integrity, and enhances the quality of life for Nebraskans. These research highlights provide only a small glimpse of ARD's research efforts, reflecting the program's relevance, timeliness, and importance.

New tool available for lean, tasty beef

IANR animal science research offers a management tool for producers eager to satisfy health-conscious consumers who savor the flavor of marbled beef but shun extra fat.

Researchers found that using information about the genetics of bulls can produce calves with less external fat that still marble and grade USDA Choice.

Most breed associations publish sire summaries featuring Expected Progeny Differences (EPDs), which predict how a bull's offspring will perform for a given trait. EPDs for some traits have been available for years, but most summaries are just now adding them for carcass traits.

Focusing on carcass EPD information, researchers selected bulls whose offspring were likely to excel at marbling, and bulls whose offspring were less likely to marble. Their offspring, from crossbred cows, were evaluated.

Results were dramatic. Calves from high-marbling EPD bulls consistently marbled with less external fat, and a higher proportion graded Choice.

Low-marbling steers required more external fat to grade Choice than high-marbling steers. For producers, cattle that need less time on feed to grade Choice should boost feedlot efficiency.

Researchers envision producers factoring carcass characteristics into overall selection programs along with many other important traits.



Animal Scientists Chris Calkins (left) and Rick Rasby examine two beef cuts that graded USDA Choice. The leaner cut on the right has less external fat and is the result of IANR research.

Biodiesel blends soy oil, modified animal fat

Diesel powers everything from trains and trucks to tractors and earth-movers. The United States consumed 21.6 billion gallons of diesel motor fuel in 1992 alone.

UNL Industrial Agricultural Products Center researchers are exploring ways to tap part of this vast market by blending modified animal fat or soy oil with diesel to create biodiesel. This new fuel could reduce

the nation's dependence on foreign oil, help meet stricter clean air standards and create new uses for agricultural crops and byproducts.

Animal fats and vegetable oils tend to solidify in cold weather, an obstacle to their use as fuel. IANR researchers are modifying fats and oils to minimize solidification, making fuel use more practical.

Exploring different blends of diesel fuel and modified animal fats and vegetable oils, they're working to identify mixtures with the fewest



Susan Ranta

UNL researchers are exploring ways to blend modified animal fat or soy oil with diesel to create biodiesel.

emissions and the best engine performance.

Biodiesel burns cleaner than conventional diesel, reducing particulate emissions, the black smoke typically associated with diesel-powered vehicles, research shows. That's important because new regulations are expected to call for substantial reductions in particulate emissions.

IANR tests showed that a blend of soybean oil and No. 2 diesel provides high performance and reduces emissions.

Now researchers are running similar tests on modified beef tallow blended with diesel. Working jointly with industry and Kansas State University, IANR researchers are launching a pilot project to test beef tallow biodiesel engine performance, durability and emissions, and demonstrate its effectiveness in a truck fleet.

IAPC researchers point out that vegetable oils and animal fats are equally important to the future of biodiesel. Both are needed to adequately supply raw materials for a significant biodiesel market. Nebraska, which leads the nation in cattle slaughter and ranks eighth in soybean production, stands to gain from developing both biodiesel sources.

IAPC researchers also are working with industry to develop solid strategies for marketing biodiesel as research leads to commercialization. Researchers are analyzing the diesel fuel industry with an eye toward opportunities and potential problems facing biodiesel. The result should be solid plans for introducing biodiesel in the Great Plains' market.

Soybean glue may hold wood products together

Soybeans someday could provide the glue for particle board and plywood.

IANR biological systems engineers in UNL's Industrial Agricultural Products Center are teaming with colleagues at two other universities to develop wood adhesives made from soybean protein.

The concept isn't new. Soy flour once was a leading wood adhesives material. Soybeans lost out to petroleum-based synthetics during World War II when demand grew for more water-resistant adhesives.

Today, researchers are exploring ways to improve soy protein's water resistance, which is essential if soy protein is to compete in the modern adhesives markets.

The aim for UNL, Iowa State University and the University of

Arkansas researchers working on the project is to produce a soy protein-based wood adhesive that is water resistant, functional and cost-effective.

Other team members focus on molecular modifications of the soy protein to enhance water resistance and on manufacturing techniques. IANR researchers are testing the strength and water resistance of particle board made with soy protein glue.

Farmers, the environment and the wood products industry would benefit if this research succeeds. The wood products industry faces increasing regulatory pressure to reduce the volatile organic compounds (VOCs) in current adhesives. VOCs pose health and environmental dangers.

Adhesives made from renewable, domestically-grown soybeans release very few VOCs. If they offer a functional substitute for synthetics, soy proteins could claim a share of the enormous wood products market, creating a new non-food use for soybeans.

Two turf options ready

Nebraskans have new turf options for reducing the water, chemicals and time they invest in lawn maintenance.

IANR horticulturists have released two improved turf buffalograss varieties well-suited for Nebraska's climate. These new varieties require 50 percent less water and fertilizer, and less pesticide than conventional turfgrasses.

These new varieties, released in 1993, normally grow to only about four inches tall. They can be left unmowed for a natural look, reducing care time, fuel and lawn clippings. Or they can be mowed every few weeks for a more groomed appearance.

NU-developed turf-type buffalograsses are superior to their prairie ancestors. They look and perform better as turf. These low-growing varieties provide a dense lawn, green up earlier in spring

and stay green longer in fall than older buffalograsses.

These new grasses result from ongoing research with aims to reduce turf water and chemical use. This project strives to offer Nebraskans low-maintenance turfgrasses and to provide new grasses for growers.

IANR turf scientists also are working with two seed producers to provide seeded varieties of NU's improved buffalograss.

If you can't beat it ...

If you can't beat it, grind it and feed it.

That's the advice an agronomist and an animal scientist at NU's Panhandle Research and Extension Center offer farmers plagued by jointed goatgrass-contaminated wheat.

Jointed goatgrass is costly for farmers. In fields, it's hard to control and reduces yields. At elevators, it's difficult and costly to remove. Some grain buyers pay 20 percent less for goatgrass-contaminated wheat.

Experimenting with different processing methods, Scottsbluff researchers found that finely grinding contaminated wheat in a hammer mill works best. This seed is not viable when fed to cattle. That means it won't pass through the animal and sprout later to cause problems.

As for feed value, goatgrass joints' protein content is comparable to barley or wheat.

Family life explored on Omaha Indian Reservation

Increased awareness and understanding are among the goals of NU family science research exploring family life on the Omaha Indian Reservation.

An NU family scientist interviewed more than 60 Omahas about strengths and challenges facing families living on the reservation. This work only scratches the surface of understanding life for the approximately 2,800 Omahas on the reserva-

tion, but researchers hope it increases Nebraskans' awareness of the Omahas' situation and of many Omahas' efforts to improve their community.

Once the hours of interviews are analyzed, the researcher will share his findings with the tribe. He hopes the Omahas can use the information to seek resources to tackle some of the challenges they face.

Little research focuses on Native American families. This work could be the springboard for expanded studies, perhaps with other Nebraska tribes and further research with Omaha families.

New penstemon variety released

Gardeners around the state soon could add a new Nebraska-adapted penstemon to their plantings.

Prairie Splendor, released by NU in early 1993, was developed by an IANR horticulturist at NU's West Central Research and Extension Center at North Platte.

The new variety has large, attractive flowers and should be available to the public within two or three years, after commercial nurseries have increased the seed.



Prairie Splendor, a new penstemon variety, features large flowers in shades of white, pink, lavender and rose.

Sheila Kelley

Flowers on Prairie Splendor's 30-inch spikes come in various shades of white, pink, lavender and rose. Plants typically flower for about four weeks beginning the first week of June.

The center's ornamental plant breeding program develops low-maintenance, drought-tolerant plants for the nursery industry.

Sorghum hulls someday could be a base for wax

Nebraskans someday just might wax their floors or cars with sorghum, or at least a sorghum component.

UNL Industrial Agricultural Products Center researchers are exploring ways to enhance sorghum processing. They want to learn what byproducts, besides starch, they might be able to extract from this Nebraska crop.

Initial studies indicate that wax on sorghum hulls is similar to carnauba wax, a vegetable wax made mostly from Brazilian palms. Carnauba wax is the preferred coating for many things, from fruits and vegetables to floors, but it is imported and expensive.

Researchers hope to find ways to economically extract wax from sorghum hulls to provide a substitute. They're experimenting with techniques to maximize wax recovery. If they succeed, sorghum wax might offer a cost-effective alternative produced from a renewable, domestic crop.

Researchers have much to learn about how best to remove the wax and how much wax modern Nebraska-grown sorghum varieties yield. IANR biological systems engineers and a food scientist also have teamed to study the quality and characteristics of sorghum waxes.

Ideally, wax and other sorghum byproducts could be recovered using processes similar to current corn wet-milling.

Researchers also will examine the potential for using kafirin, a sorghum protein, to make edible, degradable



Adding value to Nebraska's agricultural commodities, including sorghum, by developing new products and uses is one of IANR's research aims.

films. Unlike most grain-based proteins, which dissolve in water, kafirin is alcohol-soluble. This characteristic could be a plus in films production because it may offer a better moisture barrier.

New squash available

Growing, evaluating and selecting squash from seeds sent to NU more than 20 years ago, an IANR horticulturist has developed an unusual new squash variety called Lakota.

It is named for one of the region's Native American tribes. Lakota is thought to be a descendant of squash that Native Americans shared with soldiers at frontier forts. Seeds came from an Ashland woman who obtained them from friends in the Alliance area.

Similar in shape and taste to a small Hubbard squash, Lakota combines excellent baking quality with decorative fruit. Most fruits have green and orange patterns; others may be solid green or orange. Occasionally, a plant produces all three.

Lakota became available to gardeners this year; NU released it to commercial growers in 1992.

Pinto bean resists many diseases

Help is on the way for disease-weary Nebraska pinto bean growers.

A new pinto variety developed by IANR's dry bean breeding team resists bean rust and common bacterial blight, which have hurt yields and seed quality in recent years.

Called Chase, this is the first pinto bean resistant to so many diseases. It also resists brown spot and halo blight, and has a low infection rate for white mold.

Chase out-yielded top standard varieties 86 percent of the time in 15 on-farm yield trials in Nebraska and Colorado.

The bean team knows it is important for a disease-resistant variety to perform well when there's no disease, too; with no disease present, Chase yields equal top-yielding pinto varieties.

Chase's seed size, plant height and spread are similar to standard varieties, but it has a slightly later maturity date. Many Nebraska pinto beans are used for canning, so Chase also passed canning quality tests.

Chase seed should be available to farmers in 1994.

Weeds kept in dark

Turning out the lights and tilling fields at night, IANR researchers are exploring whether it's worthwhile to keep pesky weed seeds in the dark.

A weed science team is comparing day and night tillage with different tillage methods to learn whether night tillage reduces or slows weed growth. They till at night without running lights when the moon is between the last and first quarter.

European research shows night tillage significantly reduces weeds in winter cereal grains, but these findings won't necessarily translate to Nebraska. Different weeds, crops and growing conditions could influence its effectiveness here.

Light is a wake-up call for some weed seeds. Light conditions change through the year, triggering some weed species' seeds to break dormancy and germinate. No light exposure means no wake-up call for light-sensitive species.

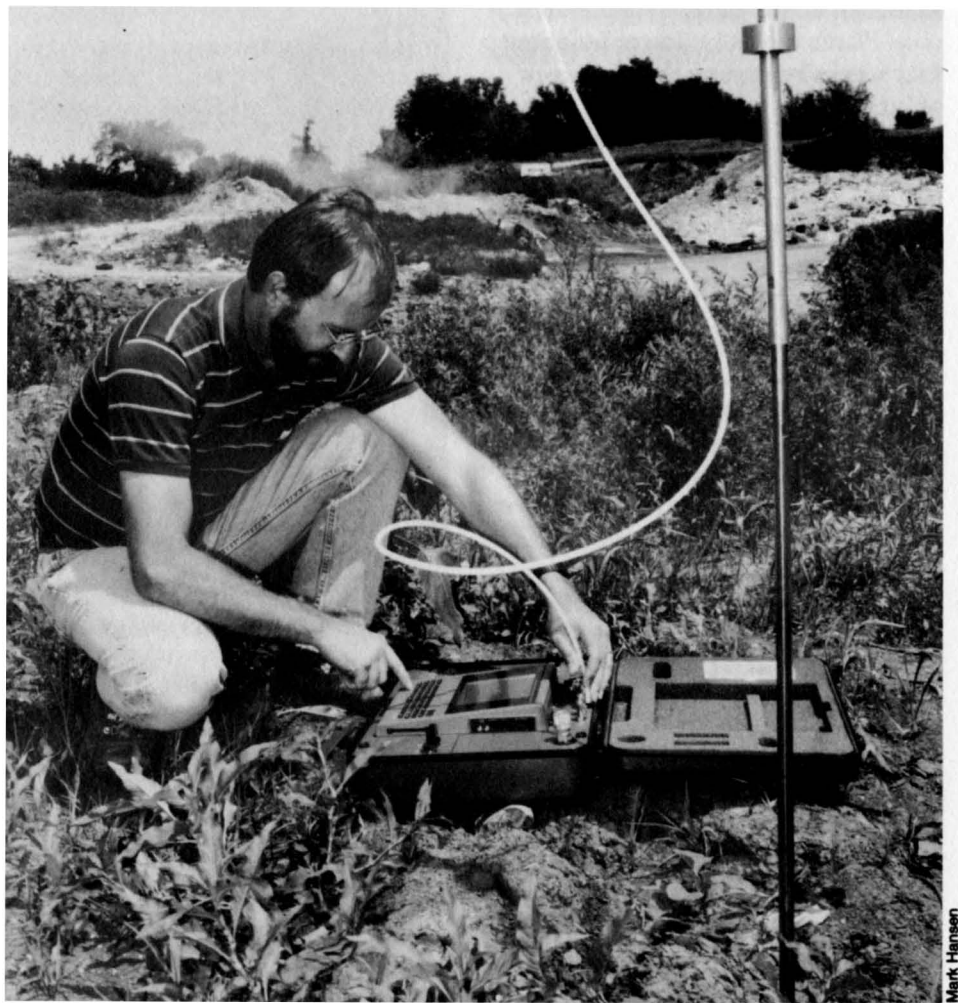
Preliminary IANR studies seem promising, but it will be at least another year before researchers know whether Nebraska farmers could thwart weeds with less herbicide by tilling at night.

Enhancing microbe improves mozzarella

Nebraska is one of the nation's top 10 mozzarella producers, and this industry is getting some help from IANR food scientists.

Two bacteria used to turn milk into mozzarella play key roles in the appearance and quality of the increasingly popular pizza cheese. An IANR microbiologist is enhancing the reliability and performance of one of them, the bacterium that influences browning in mozzarella when it's cooked.

He's exploring the organism's physiology and genetics to identify and improve strains that yield optimum cooked cheese color. His



Wayne Woldt, environmental researcher, uses soil vapor sampling to check potential gas emissions at a waste site. The shiny rod is a probe, which researchers push into a site.

team already tracked down the best currently available strains of the bacterium. These top performers, which produce non- or low-browning mozzarella, now are available to industry.

These strains offer short-term help for industry. Now the team is using biotechnology to explore ways to genetically improve the bacteria to control color even more efficiently. Ultimately, they hope to genetically manipulate the proven performers they've identified to enhance their desirable qualities.

Assessing waste sites to help state's communities

Unregulated solid waste sites scattered across Nebraska represent

potential environmental, health and financial headaches for nearby communities.

Not all active and inactive unregulated waste sites are threats, but identifying problems is complex, time-consuming and expensive. Potential problems won't disappear when the last of these sites, mostly in rural areas, close soon.

IANR biological systems engineers are exploring less expensive, faster and more accurate ways to assess waste site hazards.

Their aim is to help the state and communities stretch limited resources by reducing the costs and uncertainty related to detection and mapping of contamination at unregulated waste sites. Eventually their techniques could be used to evaluate

and rank sites for cleanup based on threats to water, environment and public health.

Relatively low costs should allow more site checks, while more accurate information should aid decision-makers. Researchers say early detection and identifying sites that pose the greatest hazard should lead to better allocation of Nebraska's finite resources.

Within five years, researchers hope to have solid information about the techniques' feasibility and a Cooperative Extension program to familiarize consulting engineers and regulators with their use and potential.

Tests to help break swine dysentery cycle

Plying biotechnology, IANR veterinary scientists are developing diagnostic tests to help break the infection cycle of highly contagious swine dysentery.

The disease costs Nebraska swine producers an estimated \$10 million annually. It can be treated with antibiotics but is difficult to eradicate from a herd. The reason: carrier-shedder pigs that appear healthy and recovered but still carry dysentery-causing bacteria, shedding it in their feces. The bacteria quickly infect

other pigs and rodents and spread into the environment, repeating the infection cycle.

Researchers used biotechnology techniques to develop a blood test that identifies pigs that have been exposed to the disease. A pig that tests positive for exposure may be fully recovered or may carry and shed bacteria.

If a pig tests positive, researchers identify carrier-shedders with help from a highly sensitive test. This test uses DNA from the disease-causing organism to detect whether a pig is still infected.

Identification and destruction of carrier-shedder pigs is the first step in breaking the swine dysentery infection cycle. Although techniques still are being developed, scientists believe it is only a matter of time before the disease is eradicated.

Hard red winter wheat variety is high-yielding

Responding to the need for an improved hard red winter wheat for southwest Nebraska, NU and USDA plant breeders have released a new variety.

Vista, which is high-yielding and disease- and insect- resistant, is the latest of many improved wheats to

grow from Nebraska's cooperative wheat breeding program.

Vista is designed for southwest Nebraska and other wheat-growing regions of the northern High Plains. This semi-dwarf variety stands well at harvest because of its short height. Some certified growers' fields of Vista yielded up to 70 bushels per acre in 1993.

Breeders say Vista also has a place as a late-planted irrigated wheat in western Nebraska. It out-yielded top varieties by as much as 21 percent in trials under those conditions.

Vista carries a gene for resistance to stem rust disease not found in other Nebraska varieties. It is moderately resistant to leaf rust and has good resistance to the destructive Hessian fly.

Vista performed well in milling and baking evaluations for the last two years. Seed was available for fall 1993 planting.

Ethanol fuels drive to clean groundwater

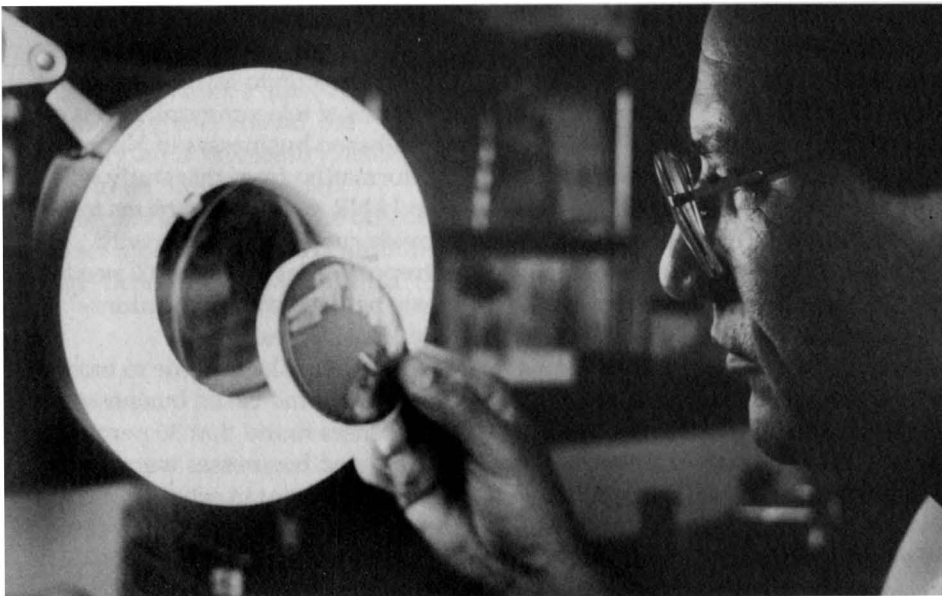
Tapping a product from Nebraska cornfields, IANR water scientists are exploring ways to stimulate native nitrate-hungry microbes in groundwater.

Native aquifer bacteria reduce nitrate by using it in their life's processes, but this microbial denitrification usually is limited. NU Water Center researchers are trying to stimulate production of these denitrifying microbes.

They're injecting pure ethanol into the shallow groundwater aquifer to feed the microbes at a test site near Central City.

Ethanol supplies ample food so bacteria begin to feed and multiply. This burgeoning population eventually depletes the aquifer's available oxygen as microbes chew up ethanol. Once available oxygen is gone, bacteria turn to nitrate to aid their life's processes, reducing it to non-toxic nitrogen gas.

Ethanol injection stimulated denitrifying microbe growth in earlier small-scale tests. Now researchers are trying to determine if



Research Veterinarian Gerald Duhamel examines a laboratory sample from a pig with swine dysentery.

the technique is feasible for cleaning up nitrate in a larger aquifer environment.

If the pilot project succeeds, ethanol injection may offer a new way to clean nitrate-contaminated groundwater around domestic residents' drinking water sources.

Infant behavior studied in new laboratory

Most parents of infants under age 2 now work outside the home, and their children often spend their days in group child care.

The NU College of Human Resources and Family Sciences' new Infant Research Laboratory is designed to study infant behavior in such group settings.

Little research has been done on infant behavior in small groups. Child development scientists hope their research will enhance knowledge of infant development and provide professional care-givers with information on how to create the most beneficial environment for infants.

The state-of-the-art laboratory allows researchers to videotape infants, sometimes playing with parents, siblings or other infants. Researchers analyze behaviors frame-by-frame using high-tech video equipment. The laboratory is among the most technically advanced of its kind in the country.

Integrated Farm project explores sustainable, profitable systems

From animal scientists to foresters, IANR researchers are teaming up to explore the best ways of integrating crops and livestock in sustainable, profitable farming systems.

On about 2,500 acres of IANR's Agricultural Research and Development Center near Mead, a new Integrated Farm project combines research on crops, grazing, feedlot management, agroforestry, which is forestry as part of farm management,

soil erosion and water quality.

Scientists from different disciplines work jointly to design and test farming systems that are economically and environmentally sound and rely mostly on renewable resources.

The Integrated Farm includes crops, a cow/calf herd and a feedlot. Crops supply most feedlot feed, and cattle graze crop residues and pastures. Windbreaks shelter some crops and livestock.

Livestock manure and soil-enriching crops provide fertilizer; crop rotation and diversity are key to crop pest control.

Incorporating varied facets of an integrated crop/livestock farm at one site allows real-world evaluations of alternative systems. Researchers studying innovative sustainable practices can see how one practice influences other aspects of the diverse system, and can explore what works best in the long run.

The Great Plains is 'indicator region'

The Great Plains holds clues to potential climate change.

It's what climatologists call an "indicator region." Slim rainfall and other environmental factors make the region particularly sensitive to relatively slight long-term climate changes. For example, if global warming were to cause a warmer, drier climate, impacts likely would show up first in the Great Plains and similar ecosystems.

One of six centers nationwide funded by the federal Department of Energy, the new center headquartered in IANR's agricultural meteorology department is helping scientists unravel the region's clues to potential climate change. Established in 1992, the Great Plains Regional Center for Global Environmental Change funds climate-related research by scientists at UNL and in seven other states.

For example, an IANR agricultural meteorologist is using state-of-the-art technology to measure changes in

emissions of methane and carbon, two major global warming contributors, in prairie wetlands and northern forests. These precise measurements will help scientists better understand potential climate change.

An IANR Forestry, Fisheries and Wildlife researcher is teaming with a climatologist to examine trees' roles in agricultural and natural ecosystems in the event of climate change. They currently are studying whether shelterbelts, which have long protected Great Plains' people, animals and crops, could extend that protection in a warmer, drier climate.

An IANR climatologist is exploring the environmental and economic consequences of climate change. He's trying to determine whether agriculture could efficiently adapt to gradual warming and declining rainfall.

Such diverse projects share a common goal: providing scientifically valid information about the myriad and complex questions related to global environmental change.

Telecommunications a tool for rural areas

Nebraskans are harnessing telecommunications technology to create jobs in rural Nebraska.

A rural sociologist and an agricultural economist, working through IANR's Center for Rural Revitalization, teamed up to learn more about the status of telecommunications and home-based businesses in Nebraska.

Information from this study will help IANR develop programs to provide rural Nebraskans with entrepreneurial skills they'll need to create new telecommunications-based businesses.

Rural Nebraska is home to most of the state's home-based businesses. Researchers found that 36 percent of home-based businesses were on farms, 21 percent in other country locations and 24 percent in towns under 10,000 people.

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:

- Woks may be a good investment for the state's pork- and beef-loving consumers. NU nutrition scientists found that stir-frying preserves flavor and nutrients in pork and beef strips. Stir-frying topped microwaving and broiling in a study of the three cooking methods' affect on appearance, taste and nutrition. Stir-fried strips retained more vitamins and minerals.
- In a bug-eat-bug world, Nebraska crops could be winners. An entomologist at NU's South Central Research and Extension Center is studying several insects as possible biological controls for crop insect pests. This work aims to expand understanding of the pest-hungry insects and to explore ways to enhance their effectiveness. Finding ways to more effectively use beneficial insects in the crop/pest battle eventually could reduce the need for insecticides.
- Better strategies for managing deer, Nebraska's most important big-game animal, are emerging from forestry, fisheries and wildlife research. Scientists tracking white-tailed deer movements in and around the DeSoto National Wildlife

Area found deer differ when it comes to movement. Some remain within the refuge; others disperse and move permanently outside DeSoto; still others migrate, spending winters at the refuge and summers elsewhere. Researchers say this study should help manage deer to benefit both deer and people.

- Soil scientists are working on a better, less-costly technique to track how much nitrogen corn takes up at different times through the growing season. If this new research tool proves effective, it could help scientists better understand how plants use soil nitrate and how nitrate is distributed in soil. That's key to fine-tuning nitrogen fertilizer application recommendations. Improved fertilizer recommendations could help farmers save money and protect the environment.
- Buying protein supplements to keep range cattle in good condition during winter can be expensive. High quality meadow hay may provide an economical alternative for extra winter protein needs and maintaining cow performance, IANR research shows. The trick is harvesting at peak quality. Animal scientists and researchers at NU's West Central Research and Extension Center at North Platte found cutting hay twice each summer produced a high quality hay and only slightly less yield. A first cutting by July 1, followed by fertilization to boost yields and protein content for a second

cutting at season's end, produced the highest quality hay.

- The genetic building blocks for a new western Nebraska feed grain are growing from IANR research. Plant breeders recently released two germplasm populations of pearl millet, which commercial breeders can use to develop hybrids. This germplasm represents years of work to improve the heat- and drought-tolerant crop to meet modern farming needs. Hybrids developed using this IANR effort someday could provide a feed-grain alternative for western Nebraska.
- Insights on dietary lead consumption in children are emerging from collaborative research involving an NU nutritionist who has teamed with an NU Medical Center researcher. A year-long diet study of 22 young children showed that simple steps such as washing hands and food preparation areas in homes helps reduce the threat of lead poisoning in young children.
- Twenty acres at NU's Northeast Research and Extension Center near Concord is an incubator of sorts for sustainable agriculture ideas. The sustainable agriculture demonstration site, established in 1990, features a variety of alternative practices aimed at reducing farm inputs, such as chemicals and commercial fertilizer.



Faculty

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.

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Agricultural/Natural Resources Departments						
Agricultural Economics						
Sam M. Cordes	Professor	0.16	0.30	0.30	0.24	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	0.45	0.55			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
Lynn H. Lutgen ¹	Associate Professor	0.30	0.70			Marketing and Policy
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	Assistant Professor	0.70	0.30			Production and Resource Economics
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
Michael S. Turner ¹	Professor	0.15	0.55	0.30		Agribusiness and Marketing
Agricultural Leadership, Education and Communication						
Allen G. Blezek	Professor	0.15	0.10	0.70		Head
Roy D. Dillon	Professor	0.30		0.70		Curriculum, Advanced Studies and Development
O.S. Gilbertson	Professor	0.25	0.15	0.60		Teacher Education/Leadership Development
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	Assistant Professor	0.60	0.15		0.25	Agricultural Climatology
Kenneth Hubbard	Associate Professor	0.50	0.20	0.10	0.20	Agricultural Climatology
David Stooksbury ²	Assistant Professor	0.40			0.60	Agricultural Climatology
Shashi Verma	Professor	0.77		0.23		Agricultural Meteorology
Elizabeth Walter-Shea	Assistant Professor	0.85		0.15		Agricultural Meteorology
Albert Weiss	Professor	0.70	0.15	0.15		Agricultural Meteorology
Donald Wilhite	Professor	0.50		0.15	0.35	Agricultural Climatology

¹Ended research appointment during 1992-1993

²Began research appointment during 1992-1993

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Agronomy						
Robert C. Shearman	Professor	0.40	0.30	0.30		Head
Bruce E. Anderson	Associate Professor	0.40	0.60			Forage Management
David J. Andrews	Professor	0.25			0.75	Millet and Sorghum Breeding
Timothy J. Arkebauer	Assistant Professor	0.85		0.15		Crop Environment Physiology
P. Stephen Baenziger	Professor	0.75		0.25		Small Grains Breeding and Genetics
Max Clegg	Associate Professor	0.85		0.15		Crop Physiology
Steven D. Comfort ²	Assistant Professor	0.75	0.25			Soil Environmental Chemist
William A. Compton ¹	Professor	0.90		0.10		Corn Breeding
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	0.37	0.38		0.25	Cropping Systems/Sustainable Agriculture Systems Center
Kenneth D. Frank	Associate Professor	0.25	0.25		0.50	Soil Fertility/Soil Testing
George L. Graef	Assistant Professor	0.85		0.15		Soybean Breeding
Robert Graybosch	Assistant 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
Shawn M. Kaeppler ²	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	Professor				USDA	Soil Physics
Kenneth Moore	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	0.55		0.20		Weed Physiology
Jeffrey Pedersen	Associate Professor				USDA	Sorghum Genetics and Breeding
C. James Peterson	Associate Professor				USDA	Wheat Genetics
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
Patrick J. Shea	Associate 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	0.50		0.10	0.40	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
Charles Y. Sullivan ¹	Professor				USDA	Crop Physiology
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
Steven S. Waller ¹	Professor	0.55		0.45		Range Management and Improvement
Daniel T. Walters	Associate Professor	0.60		0.40		Soil Management
Wallace W. Wilhelm	Associate Professor				USDA	Crop Physiology

¹Ended research appointment during 1992-1993

²Began research appointment during 1992-1993

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Animal Science						
Elton D. Aberle	Professor	0.35	0.34	0.31		Head
Mary M. Beck	Associate Professor	0.70		0.30		Poultry Physiology
Gary L. Bennett	Associate Professor				USDA	Systems
Michael D. Bishop ²	Assistant Professor				USDA	Breeding
Dennis R. Brink	Professor	0.30		0.70		Ruminant Nutrition
Robert A. Britton	Professor	0.70		0.30		Ruminant Biochemistry
Chris R. Calkins	Associate Professor	0.70		0.30		Meats
Ronald K. Christenson	Professor				USDA	Physiology
Edgar T. Clemens	Professor	0.50		0.50		Gastroenteric Physiology
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	0.60		0.40		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 ²	Assistant Professor	0.75		0.25		Rumen Microbiology
Merlyn K. Nielsen	Professor	0.60		0.40		Breeding and Genetics
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 ²	Assistant Professor				USDA	Breeding
Rick A. Stock	Associate Professor	0.50	0.50			Feedlot Nutrition
Sheila E. Scheideler ²	Associate Professor	0.25	0.75			Poultry Management
Thomas W. Sullivan ¹	Professor	0.65		0.35		Poultry Nutrition
L. Dale Van Vleck	Professor	0.05		0.15	USDA	Breeding and Genetics
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
Biochemistry						
Marion H. O'Leary	Professor	0.45		0.25	0.30	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	0.40		0.10	0.50	Molecular Biology
John H. Golbeck	Professor	0.30		0.20	0.50	Biophysics/Chemistry of Photosystems
Robert V. Klucas	Professor	0.90		0.10		Nitrogen Fixation
Herman W. Knoche	Professor	0.80		0.20		Lipid Biochemistry
John P. Markwell	Associate Professor	0.90		0.10		Plant Biochemistry
Stephen W. Ragsdale	Associate Professor	0.85		0.15		Enzymes
Robert J. Spreitzer	Associate Professor	0.85		0.15		Plant Molecular Genetics
Fred W. Wagner	Professor	0.90		0.10		Enzymes

¹Ended research appointment during 1992-1993

²Began research appointment during 1992-1993

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Biological Systems Engineering						
Glenn J. Hoffman	Professor	0.35	0.50	0.15		Head
Leonard Bashford	Professor	0.55		0.35	0.10	Tractors and Design Engineering
Rangaswamy Chinnaswamy ¹	Assistant Professor	1.00				Cereal Grain Utilization
Dean E. Eisenhauer	Professor	0.75		0.25		Surface Irrigation and Chemigation
John E. Gilley	Associate Professor				USDA	Soil Erosion
Robert D. Grisso	Associate Professor	0.25	0.75			Agricultural Machinery
G. L. Hahn	Professor				USDA	Livestock Housing and Stress Management
Milford A. Hanna	Professor	0.45		0.10	0.45	Food and Bioprocess Engineering
Terry A. Howell	Professor				USDA	Irrigation Scheduling
David Jones	Assistant Professor	0.35		0.65		Product Handling and Storage
Michael 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 Meagher	Assistant Professor			0.20	0.80	Bioprocess Engineering
George E. Meyer	Associate Professor	0.60		0.40		Plant Growth Modeling
Lloyd Mielke	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
Thomas L. Thompson ¹	Professor	0.40	0.30	0.30		Computerized Information Systems
Kenneth Von Bargaen	Professor	0.55		0.45		Equipment Systems Management
Darrell Watts	Professor	0.60	0.40			Water Quality/Irrigation
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
Entomology						
John E. Foster	Professor	0.38	0.50	0.12		Head
Frederick P. Baxendale	Associate Professor	0.25	0.75			Turf Insects
Stephen D. Danielson	Assistant Professor	0.25	0.75			Forage Insects
Mary Ellen Dix	Associate Professor				USDA	Shelterbelt Insects
Mark O. Harrell	Associate Professor				1.00	Nebraska Forest Service
Leon G. Higley	Assistant Professor	0.80		0.20		Insect Ecology
Wayne L. Kramer	Assistant Professor				1.00	Medical Entomology
Z B Mayo	Professor	0.80		0.20		Cytogenetics of Greenbugs
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
Kenneth P. Pruess	Professor	0.80		0.20		Aquatic Insects
Blair D. Siegfried	Assistant Professor	0.80		0.20		Insect Toxicologist
Steven R. Skoda	Assistant Professor				USDA	Livestock Entomology
David W. Stanley-Samuels	Associate Professor	0.55		0.20		Insect Physiologist
David B. Taylor	Associate Professor				USDA	Livestock Entomology
Gustave D. Thomas	Professor				USDA	Livestock Entomology

¹Ended research appointment during 1992-1993

²Began research appointment during 1992-1993

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
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 Engineering
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	Professor	0.40		0.60		Food Biochemistry/Microbiology
Khem H. Shahani	Professor	0.45		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 ²	Assistant Professor			0.20	0.80	Food and Bioprocess Engineering
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	0.61		0.10	0.29	Forestry, Conservation Forestry/ Windbreaks
Ronald M. Case	Professor	0.40		0.60		Wildlife, Terrestrial Wildlife Ecology
Bert M. Cregg ²	Assistant Professor				USDA	Forestry, Physiology
Stephen G. Ernst	Associate Professor	0.75		0.25		Forestry, Genetics
Mark O. Harrell	Associate Professor	0.25			0.75	Nebraska Forest Service, Forest Insects and Diseases
Kyle D. Hoagland	Associate Professor	0.75		0.25		Fisheries, Aquatic Ecology
Dennis E. Jelinski ²	Assistant Professor	0.25		0.75		Forestry, Landscape Ecology
Ron J. Johnson	Associate Professor	0.31	0.43		0.26	Wildlife, Terrestrial Wildlife Ecology
Terrence B. Kayes	Associate Professor	0.25	0.75			Fisheries, Aquaculture
Ned B. Klopfenstein	Assistant Professor				USDA	Forestry, Molecular Genetics
Edward J. Peters	Associate Professor	0.40		0.60		Fisheries, Riparian Systems
Willis J. Rietveld	Professor				USDA	Forestry, Physiology
Julie A. Savidge	Assistant Professor	0.40		0.60		Wildlife, Terrestrial/Avian Ecology
Michele M. Schoeneberger	Assistant Professor				USDA	Forestry, Forest Soils
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	Associate 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			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	0.57	0.18		News
Terrence Meisenbach	Assistant Professor	0.22	0.58	0.20		Publications
Charlotte Murphy ¹	Assistant Instructor	0.10	0.90			News
James K. Randall	Professor	0.10	0.90			Radio

¹Ended research appointment during 1992-1993

²Began research appointment during 1992-1993

	Rank	Rsch	Ext	Tch	Other	Area of Responsibility
Plant Pathology						
Anne K. Vidaver	Professor	0.75	0.15	0.10		Head
Martin B. Dickman	Assistant 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

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	0.85		0.15		Molecular Virology
Clayton L. Kelling	Associate Professor	0.94		0.06		Research Virology
Rodney A. Moxley	Associate Professor	0.20		0.10	0.70	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		0.87	0.06	0.07	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 A. Wallner-Pendleton	Assistant Professor		0.60		0.40	Poultry Diseases
Dale M. Webb	Assistant Professor				1.00	Diagnostic Pathology

College of Human Resources and Family Sciences

Family and Consumer Sciences

Shirley L. Baugher ²	Professor	0.25	0.20	0.55		Chair
Douglas A. Abbott	Associate Professor	0.40	0.60			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	0.39	0.61			Infant Social Development
William H. Meredith	Professor	0.25	0.75			Youth at Risk
Kathy Prochaska-Cue	Associate Professor	0.25	0.75			Family Management
Craig W. Smith	Associate Professor	0.25	0.75			Family Interactions
John Woodward	Professor	0.48	0.52			Youth at Risk
Pauline Davey Zeece	Associate Professor	0.25	0.75			Child Care

¹Ended research appointment during 1992-1993

²Began research appointment during 1992-1993

	Rank	Rsch	Ext	Tch	Other	Department (Area of Responsibility)
Nutritional Science and Dietetics						
Marilynn Schnepf	Associate Professor	0.50	0.10	0.40		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	Professor	0.50		0.50		Nutrition
Nancy Lewis	Assistant Professor	0.44		0.56		Nutrition
Kaye Stanek	Associate Professor	0.25		0.75		Nutrition
Textiles, Clothing and Design						
Rita C. Kean	Associate Professor	0.25	0.15	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 Niemeier	Associate Professor	0.25	0.75			Environmental Issues
Off-Campus Research and Extension Centers						
Northeast Research and Extension Center						
Donald B. Hudman ¹	Professor	0.23	0.69		0.08	Director
Robert D. Fritschen ²	Professor	0.17	0.83			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 (Irrigation Management)
Terry L. Mader	Associate Professor	0.50	0.50			Animal Science (Beef Feedlot Management)
David Holshouser ²	Assistant Professor	0.49	0.51			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						
Robert D. Fritschen ¹	Professor	0.42	0.50	0.08		Director
Burton A. Weichenthal	Professor		0.50	0.50		Associate Director and Animal Science (Beef Cattle); Interim Director
David D. Baltensperger	Associate Professor	0.75	0.25			Agronomy (Crop Breeding)
Gregory Binford	Assistant Professor	0.50	0.50			Agronomy (Soil Science)
Dale M. Grotelueschen	Associate Professor	0.50	0.50			Diagnostic Veterinary Science (Vet Science)
Gary L. Hein	Assistant Professor	0.50	0.50			Entomology (Entomology)
Eric D. Kerr	Professor		0.50	0.50		Plant Pathology (Plant Path)
Drew Lyon	Assistant Professor	0.50	0.50			Agronomy (Dryland Crops)
Alex 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)

¹Ended research appointment during 1992-1993

²Began research appointment during 1992-1993

	Rank	Rsch	Ext	Tch	Other	Department (Area of Responsibility)
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	Assistant 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	Assistant Professor	0.50	0.50			Entomology
Southeast Research and Extension Center						
Lloyd D. Young	Professor	0.05	0.87	0.08		Director
West Central Research and Extension Center						
Delwyn D. Dearborn	Professor	0.50	0.50			Interim Director; Associate Director
Pete W. Jacoby, Jr. ²	Professor	0.50	0.50			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
James T. Nichols ¹	Professor	0.50	0.50			Agronomy (Range/Forage)
Paul T. Nordquist	Professor	1.00				Agronomy (Sorghum/Corn Breeding)
Gail A. Wicks	Professor	0.50	0.50			Agronomy (Ecofarming/Weeds)
Water Center/Environmental Programs						
Robert T. Volk	Professor	0.75			0.25	Director
Shripat T. Kamble	Associate Professor	0.25	0.75			Pesticide Impact Assessment
Robert D. Kuzelka	Associate Professor	0.50		0.20	0.30	Assistant Director
Roy F. Spalding	Professor	0.25			0.75	Associate Director
Edward F. Vitzthum	Associate Professor	0.25	0.75			Coordinator/Environmental Programs

¹Ended research appointment during 1992-1993

²Began research appointment during 1992-1993



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 members 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 1992-93 include:

Agronomy

P. Stephen Baenziger was named an honorary professor by the Ningxia Academy of Agricultural and Forestry Sciences in the People's Republic of China.

Charles A. Francis received the Robert E. Wagner Award for Efficient Agriculture from the American Society of Agronomy. Francis also was named a Fellow in the American

Society of Agronomy and in the Crop Science Society of America.

Robert C. Shearman received the Fred V. Grau Turfgrass Science Award from the Crop Science Society of America.

William A. Compton was named a Fellow in the American Association for the Advancement of Science.

Paul T. Nordquist received a Distinguished Service Award from the Nebraska Crop Improvement Association.

Dale Swartzendruber received an Editor's Citation for Excellence in Manuscript Review from the Soil Science Society of America Editorial Board.

Animal Science

Charles H. Adams received the R.C. Pollock Award from the American Meat Science Association.

D. Murray Danielson received the Animal Management Award from the American Society of Animal Science.

Keith E. Gregory was inducted into membership in the Nebraska Hall of Agricultural Achievement.

Mohammad Koohmaraie received the Outstanding Early Career Research Scientist of the Year Award from the USDA Agricultural

Research Service.

Roger W. Mandigo received an Animal Science Advanced Degree Graduate of Distinction Award from Oklahoma State University.

Merlyn K. Nielsen received an Excellence in Research Award from Gamma Sigma Delta, the honor society of agriculture.

Ernest R. Peo, Jr. received the Agricultural Achievement Award from Knights of Ak-Sar-Ben.

Biological Systems Engineering

Thomas L. Thompson received an American Society of Agricultural Engineers Fellow Award from the American Society of Agricultural Engineers.

Derrel L. Martin received a USDA Unit Award for Distinguished Service from the USDA Agricultural Research Service.

Entomology

Leon G. Higley received a Junior Faculty Recognition for Excellence in Research Award from NU's Agricultural Research Division.

Family and Consumer Sciences

D.A. Abbott was named to the Margaret Killiam Distinguished Professorship in Home Economics at the University of Nebraska-Omaha.

E.P. Davis was cited by the Association for Financial Counseling and Planning Education for the outstanding publication for 1992.



Mark Hansen

Food Scientist Robert Hutkins received a Junior Faculty Recognition for Excellence in Research Award from NU's Agricultural Research Division. He aims to improve the bacterium responsible for excessive browning in cooked mozzarella. Enhancing the bacteria to yield optimum cooked cheese color will help cheese makers meet food makers' exacting demands.

J. DeFrain was named a Fulbright Scholar by the J. Williams Fulbright Board of Foreign Scholarships.

W.H. Meredith was cited for distinguished scholarly activity by the College of Human Resources and Family Sciences.

Food Science and Technology

Robert W. Hutkins received a Junior Faculty Recognition for Excellence in Research Award from NU's Agricultural Research Division.

Horticulture

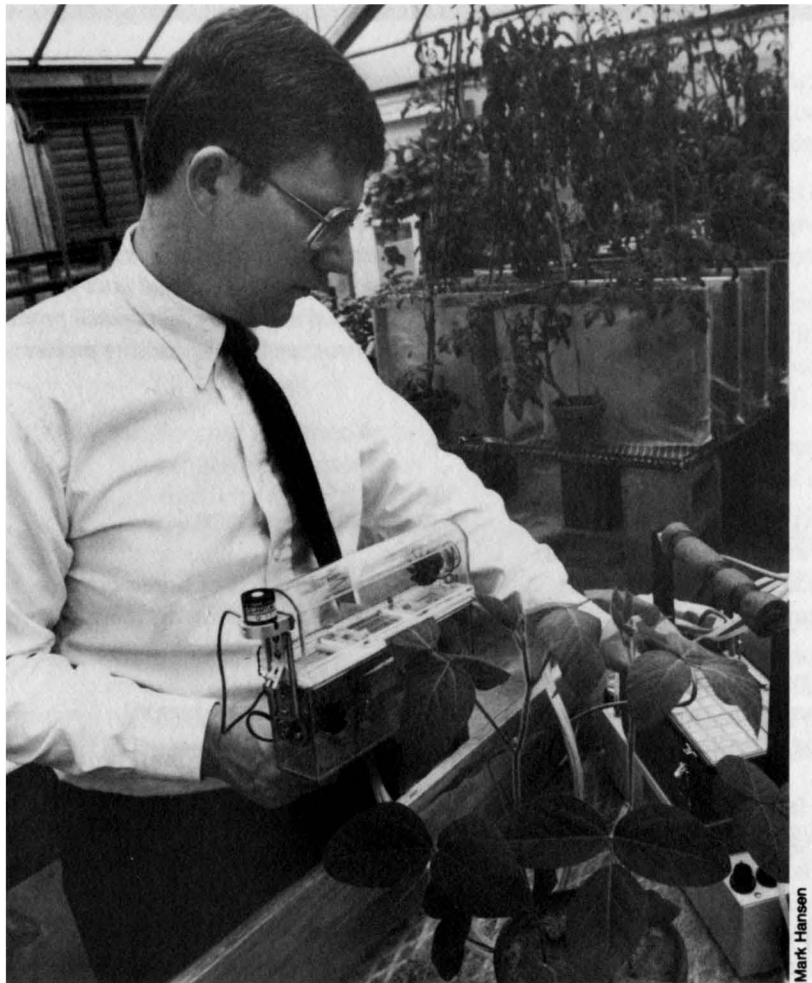
William A. Gustafson, Jr. was recognized for "Outstanding Cooperation in the Research Program of Northern Nuts Introduction in China" by the Chinese Institute of Forestry, The Chinese Academy of Forestry, Beijing, China.

Gerald L. Horst received a Merit Award from the Nebraska Ground Water Foundation, Mayor's Water Conservation Task Force.

Dermot P. Coyne, M.F. Mohamed and **P.E. Read** all received an Abbott Award for Best Research Paper from the Plant Growth Regulator Society of America.

Northeast Research and Extension Center

Michael C. Brumm received the 1992 Nebraska Pork Industry Service Award. He also received an IANR Team Award for swine enterprise records programs from NU's Institute



Entomologist Leon Higley received a Junior Faculty Recognition for Excellence in Research Award from NU's Agricultural Research Division. He's shown using a portable photosynthesis analyzer to check a soybean leaf's photosynthesis rate. Higley leads a team of scientists in eight states who are studying how soybeans respond to defoliating insects.

of Agriculture and Natural Resources.

David P. Shelton received an Honorable Mention ASAE Paper Award from the American Society of Agricultural Engineers.

Panhandle Research and Extension Center

Patrick E. Reece received a University of Nebraska Livestock Service Award sponsored by Walnut Grove Products Company.

Ivan G. Rush was inducted into membership in the Nebraska Hall of Agricultural Achievement.

Plant Pathology

James L. Van Etten received an Outstanding Research and Creative

Activity Award from the University of Nebraska.

Textiles, Clothing and Design

Patricia Cox Crews received the Outstanding Professor Award from the College of Human Resources and Family Sciences.

Veterinary and Biomedical Sciences

Fernando Osorio received the Pan American Foot and Mouth Disease Center Award from the Pan American Health Organization in Rio de Janeiro, Brazil.



Research Projects

Each faculty member with an ARD appointment has a federally-approved research project. A number of faculty have multiple projects. There are nearly 350 approved research projects in agriculture, natural resources and home economics. 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 departments and project leader(.). An asterisk (*) indicates that the project was discontinued in fiscal year 1992-1993.

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

- ha - Hatch
- rr - regional research
- st - state
- ms - McIntire-Stennis
- sg - special grant
- cg - competitive grant
- ah - animal health
- (see footnote definition of project type)

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)
- 10-104* ha Empirical evaluation of integrating fundamental and technical market analysis (L. H. Lutgen, J. G. Kendrick)
- 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)
- 10-110* rr Water management and conservation in western irrigated agriculture (R. J. Supalla, D. L. Martin)
- 10-111 rr Quantifying long-run agricultural risks and evaluating farmer responses to risk (D. M. Conley, G. Helmers)

ha - Hatch: "Hatch formula funds" means those funds appropriated by Congress to be distributed to the States subject to the state matching requirements. It includes 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; home economics, including human nutrition and family life; and rural and community development.

st - State: State projects are research on all aspects of agriculture, natural resources, home economics and rural development that are supported entirely by state funds.

ms - McIntire Stennis: The McIntire-Stennis Act includes investigations 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 improved 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.

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

rr - Regional Research: The term "Regional Research Funds" means those funds appropriated by Congress to be allotted as 25 percent of total Hatch fund expenditures.

- 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)

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

- 27-002* **rr** Chemistry of atmospheric deposition — effects on agriculture, forestry, surface waters and materials (S. B. Verma)
- 27-003 **ha** Exchange of carbon dioxide and other atmospheric trace gasses 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)

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, durumms 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)
- 12-152* **ha** Renovation and improvement of Nebraska range and pasture (S. S. Waller)
- 12-158* **ha** Crop rotations and manure versus conventional fertilizers and chemical practices (C. A. Francis, M. D. Jawson, A. R. Martin, S. C. Mason, J. F. Power, P. J. Shea, D. T. Walters)
- 12-162 **ha** Ecological and agronomical manipulation of Nebraska rangeland vegetation (J. L. Stubbendieck)

- 12-171A* ha Selecting wheat and other cereal grains with improved market quality (D. Shelton, P. S. Baenziger, C. J. Peterson)
- 12-172* ha Studies on the physiological basis for improving efficiency of nitrogen metabolism (J. W. Maranville)
- 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 bio-availability 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)
- 12-182* sg Investigating milkweed as an alternative source of fiber (L. A. Nelson, K. VonBargen, P. Crews, A. K. Vidaver, D. D. Baltensperger, J. B. Campbell, R. W. Elmore)
- 12-184 ha Soybean breeding and genetic studies for Nebraska (G. L. Graef)
- 12-185 ha Methodology of comparing best management practices for ground-water 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)
- 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)
- 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** Evaluating the utilization of grain diets fed to finishing cattle (R. A. Stock, R. A. Britton, T. J. Klopfenstein, T. L. Mader)
- 13-080 ha** Factors regulating protein turnover and growth in skeletal muscle (S. J. Jones)
- 13-083* rr** Improving dairy cattle genetically (J. F. Keown)
- 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)
- 13-089* ah** Metabolism in chick brains: cellular aspects (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 beef cattle (T. J. Klopfenstein, L. E. Moser, T. Thompson, S. S. Waller, B. E. Anderson)
- 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)
- 13-103* rr Skeletal problems in poultry (T. W. Sullivan)
- 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 post-puberty (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)
- 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)
- 15-057* cg Chloroplast heteroplasmic suppression (R. J. Spreitzer)
- 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 C₄ PEPC and PPDK phosphorylation cycles (R. Chollet)

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)

11-067* rr Irrigation scheduling methods for efficient water and energy use (D. G. Watts, D. L. Martin)

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 ag profitability (G. E. Meyer)

11-082 ha Decision support systems for the agricultural producer (T. L. Thompson)

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 (T. L. Thompson)

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)

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-Samuelson)

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)

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)

Forestry, Fisheries and Wildlife

- 26-008* ms Forest tree improvement—selection, breeding and investigation of gene control and structure (S. G. Ernst)
- 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. Paparozzi)
- 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)

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)
- 21-038* ha Use of recombinant DNA technology to study population genetics of soybean cyst nematode (T. O. Powers)
- 21-039 rr Reduction of corn losses caused by nematodes in the NC region (T. O. Powers)
- 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)

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)
- 14-040* rr Occurrence of mycotoxins in feed and foods and their effects on animal and human health (N. R. Schneider)
- 14-044 sg Bovine respiratory syncytial virus subunit vaccine, immunity, and rapid diagnosis (C. L. Kelling)
- 14-048* ah The immunobiology of enteric diseases of swine and cattle (G. E. Duhamel)
- 14-049 ah Molecular characterization of virus-host cell receptor interactions (S. Srikumaran)
- 14-051* sg Induction of cellular immunity to BHV-1 by anti-clonotypes (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)

- 14-056* **sg** Interaction of persistent viruses with the bovine immune system: the cellular basis of BVDV lymphotropism (F. A. Osorio)
- 14-057* **sg** Molecular bases of BVD virus cytopathology and disease (R. O. Donis)
- 14-058 **ah** Molecular characterization of bovine viral diarrhea 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)
- 14-061* **sg** Enhancement of immunity to bovine respiratory syncytial virus infections (C. L. Kelling, L. J. Perino, R. D. Oberst)
- 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)
- 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)
- 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)
- College of Human Resources and Family Sciences Departments**
- Family and Consumer Sciences**
- 92-014* **ha** Changes in the economic well-being of Nebraska families, 1981-1986 (E. P. Davis)
- 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)
- Nutritional Science and Dietetics**
- 91-020 **rr** Nutrient bioavailability — a key to human nutrition (C. V. Kies)
- 91-025 **rr** Health maintenance aspects of dietary recommendations designed to modify lipid metabolism (C. V. Kies)
- 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

- 94-014* rr Textile fiber systems for performance, protection and comfort (P. Cox-Crews)
- 94-015* rr Reducing pesticide exposure of applicators through improved clothing design and care (J. M. Laughlin)
- 94-016* ha Functional topical finishes for enhancing color stability and strength retention in textiles (P. Cox-Crews)
- 94-017 rr Rural retailing: impact of change on consumer and community (R. C. Kean)
- 94-018* rr The changing structure of local labor markets in nonmetropolitan areas (A. Ziebarth)

- 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)
- 42-012* ha Conservation of soil and water utilizing inter-row cultivation techniques (W. L. Kranz)
- 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)

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)
- 44-037* ha Development of dryland cropping systems for western Nebraska (D. A. Martin)
- 44-038* ha Cultural and nutrient investigations for crops in western Nebraska (D. D. Baltensperger)
- 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)

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.)

48-012* ha Improvement of fertilizer use efficiency for conservation tillage crops in south-central Nebraska (R. B. Ferguson)

48-013* ha Information and producer decisions in central Nebraska agriculture (R. A. Selley)

48-014* ha Biology, control and cost of shattercane and velvetleaf in south-central Nebraska (F. W. Roeth)

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)

43-043* ha Evaluation of complementary forage systems (J. T. Nichols)

43-044* ha Weed control in reduced tillage (G. A. Wicks)

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)

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 Non-food 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

- 25-001* sg Continuing participation in the national agricultural pesticide impact assessment program (S. T. Kamble)
- 25-002 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)



Publications

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 135 different scientific journals during 1992. Faculty also have written numerous books, edited books or contributed book chapters.

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 1992.

Journals in which faculty have published in 1992

Agricultural Economics

Agribusiness: An International Journal
Applied Economics
Journal of Agricultural Cooperation
Journal of Agricultural Economics
Journal of Economic Studies
Journal of Economics and Business
Journal of Production Agriculture
Southern Economic Journal
University of Nebraska Law

Agricultural Meteorology

Agricultural Systems
Biogeochemistry
Boundary-Layer Meteorology
Bulletin of the American Meteorological Society
Climate Research
Finnish Peatland Society
Journal of Geophysical Research
Remote Sensing of Environment

Agronomy

Agronomy Journal
Communications in Soil and Plant Analysis
Conservation Tillage Practices for Grain Farming in Semi-arid Regions
Crop Science
Genome
Journal of Geophysical Research
Journal of Production Agriculture
Journal of Range Management
Journal of Soil and Water Conservation

Plant Breeding
Plant Physiology
Proceedings of the National Academy of Science USA
Soil Science
Soil Science Society of America Journal
The Prairie Naturalist
Theoretical and Applied Genetics
Transactions of the Nebraska Academy of Sciences
Weed Science
Weed Technology

Animal Science

Animal Feed Science Technology
Biology of Reproduction
Journal of Animal Science
Journal of Dairy Science
Journal of Farm Managers and Rural Appraisers
Journal of Reproduction and Fertility
Meat Science
Nutrition Research
Poultry Science
Theriogenology
Transactions of the American Society of Agricultural Engineers

Biochemistry

Biochemistry
Journal of American Chemical Society
Journal of Bacteriology
Journal of Biological Chemistry
Photosynthesis Research
Plant Physiology
Plant Physiology Biochemistry

Biological Systems Engineering

American Society of Civil Engineering
Applied Engineering in Agriculture
Agricultural Water Management
Cereal Foods World
Computers and Electronics in Agriculture
Journal of Hydrology

Biometry

Environmental Entomology
Journal of Veterinary Diagnostic Investigation
Theoretical and Applied Genetics

Entomology

Agri-Practice
American Entomologist
American Entomologist Forum
Annals of the Entomological Society of America
Archives of Environmental Contamination and Toxicology
Biological Control
Bulletin of Environmental Contamination and Toxicology
Comparative Biochemistry and Physiology
Crop Protection
Journal of Agricultural Entomology
Journal of Economic Entomology
Journal of Insect Physiology
Journal of the Kansas Entomological Society
Journal of Medical Entomology

Food Science and Technology

Applied Environmental Microbiology
BioPharm
Cereal Foods World
Clinical Experimental Allergy
Dairy, Food and Environmental
Sanitation
Journal of Agricultural and Food
Chemistry
Journal of Food Protection
Journal of Food Science
Journal of Industry Microbiology
Journal of Muscle Foods
Starch/Starke

Forestry, Fisheries and Wildlife

American Midland Naturalist
Journal of North American
Benthological Society
Journal of Production Agriculture
Journal of Wildlife Diseases
North American Journal of Fisheries
Management

Horticulture

Acta Horticulturae
Euphytica
HortScience
Journal of American Society of
Horticultural Science
Journal of Environmental Horticul-
ture
Plant Disease
Plant Growth Regulator Society of
America Quarterly

Plant Pathology

Biological Control
Gene
Intervirology
Molecular and General Genetics
Nucleic Acids Research
Physiological and Molecular Plant
Pathology
Phytopathology
Virology

Veterinary and Biomedical Sciences

Agri-Practice
American Journal of Veterinary
Research
Biology of Reproduction
Chemical Biological Interactions
European Journal of Immunology
Journal of General Virology
Journal of Immunology
Journal of Veterinary Diagnostic
Investigation
Journal of Virology
Laboratory Animal Science
Microbial Pathogenesis
Viral Immunology

College of Human Resources and Family Sciences Departments

Family and Consumer Sciences

Adolescence
International Journal of Early
Childhood
International Journal of Sociology of
the Family
Journal of Psychology
Journal of Social Psychology

Nutritional Science and Dietetics

Dairy Food and Environmental
Sanitation
Journal of the American Dietetic
Association
Plant Foods for Human Nutrition

Textiles, Clothing and Design

Archives of Environmental
Contamination and Toxicology
International Journal of Clothing
Science and Technology
Journal of Theory in Home
Economics

Off-Campus Research Centers

Northeast Research and Extension Center

Farm Managers and Rural Appraisers
The Professional Animal Scientist

Panhandle Research and Extension Center

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- Balasubramanian, N. 1992.
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- Bhuyan, S. 1992.
Agricultural cooperatives and vertical integration: A theoretical analysis. (J.S. Royer, Advisor)
- Li, Z. 1992.
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- Lubben, B.D. 1992.
A critical evaluation of an integration extension program: The Nebraska Soybean Profitability Project. (H.D. Jose, Advisor)

- Mohanty, S. 1992.
An empirical estimation of the existence of kink in the U.S. wheat export demand. (N.H. Cottrell, Advisor)
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- Zhang, M. 1992.
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Ph.D. Dissertation

- Smith, D.B. 1992.
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Effect of rate and time of application on pearl millet response to nitrogen. (J.W. Maranville, Advisor)
- Ph.D. Dissertations**
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Panhandle Research and Extension Center

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M.S. Theses

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Wachal-Hancock, R.F. 1992.

Effects of Synovex C implants on growth rate, pelvic area, reproduction and calving performance of replacement heifers. (G.H. Deutscher, Advisor)

Ph.D. Thesis

Catangui, M.A. 1992.

Performances of brahman-crossbred and English x exotic-crossbred feeder heifers when exposed to stable flies. (J.B. Campbell, Advisor)



Variety and Germplasm Releases

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

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 1992-1993.

Agronomy

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

Germplasm release: N203 and N205

Scientists: W.A. Compton and W.C. Youngquist

Characteristics: N203 and N205 are S5 inbred lines derived by selfing from NBS2(4). They have good vigor and high yields with relatively good seed quality and good pollen production, even under stressful conditions. Both are well-adapted to the south-east Nebraska area, and other similar areas requiring stress resistance.

N203 is tall and flowers about a day later than B73. In crosses with B73 and similar lines, it is higher in yield and about 1 percent higher in moisture at harvest, and has a slightly greater root and stalk lodging than does B73 x Mo17. N205 is a short, stocky, dark green line classified at 1460 heat units to flowering. It also stays green longer. It yields as well or better than B73 x Mo17 crossed to B73, has slightly less stalk breakage and slightly greater root lodging.

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

Germplasm release: NPM-1 and NPM-2

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

Characteristics: NPM-1 (Mid-Late Synthetic) and NPM-2 (Early Dwarf Synthetic) germplasms were produced from two phenotypically different groups of progenies from the Nebraska Dwarf Pearl Millet Population, as identified in a progeny test conducted in 1985. NPM-1 and NPM-2 and their topcrosses to male sterile 68A₁ show these populations to have good combining ability and to be restorers on A₁ cytoplasm. They have value for direct use as pollen parents or as sources of restorer lines for producing early maturing grain hybrids. Plant height and days from planting to bloom varied from 84 to 136 cm and 45 to 77 days for NPM-1, and 76 to 122 cm and 41 to 70 days for NPM-2. Principal dwarfing gene is the common d₂ gene. Grain color is light gray, grain weight 0.95 g/100 (NPM-1) and 0.93 g/100 (NPM-2). Susceptibility to major pathogens has not been observed. European corn borer [*Ostrinia nubilalis* (Hubner)] have been observed in the peduncles in eastern Nebraska.

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

Germplasm release: N133 A/B Pair Inbred Line

Scientist: P.T. Nordquist, W. Ross, and R. Helsing

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

Characteristics: The fertile line is a medium short, 3dw, red-seeded line, that is a non-restorer (B line), to milo male sterile (A₁) cytoplasm. It is relatively early, blooming 2 to 4 days earlier than lines such as CK60, KS57 and 'Wheatland', but 1 to 3 days later than N123 and Tx3042. Hybrids tend to be about mid-season maturity for the North Platte area, and a bit early for the main sorghum production areas, unless longer season restorer lines are used as pollinators. Seed color is bright red in a medium open panicle, with brown, medium clasping glumes, and rudimentary awns. Plant color is purple. Stalk qualities are variable depending on the males used, with lodging percentages generally lower than CK-60 and Tx623 hybrids, but somewhat higher than those with KS57 when mated to the same pollinators.

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

Germplasm release: N127 through N132 A/B Pair Inbred Lines

Scientists: J.F. Pedersen and B.E. Johnson

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

Characteristics: These six A/B pair lines are unique in having been derived from the RP2B population (originating from American and exotic lines from Uganda and the Texas-ARS Puerto Rico Conversion Program), and offer much needed diversity to industry as potential seed parents, or as source material for continued sorghum improvement.

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

Germplasm release: MO/PSD-0259, a Phomopsis seed decay (PSD) resistant germplasm

Scientists: H.C. Minor, E.A. Brown, B. Doupnik Jr., R.W. Elmore, and M.S. Zimmerman

Released by: University of Missouri Agricultural Experiment Station and the University of Nebraska Agricultural Research Division

Characteristics: This genotype is an F5-derived line from the cross PI 417479 x Merschman 'Dallas'. Yield of MO/PSD-0259 is superior to that of PI 417479 and 87 percent and 88 percent of that of 'Hobbit' 87 and 'Williams 82', respectively. The line is short-statured with a determinate growth habit, purple flowers, gray pubescence, and brown pod walls. It matures approximately 1 day later than Williams 82.

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

Variety name: 'Holt'

Scientists: G.L. Graef, J.E. Specht, D.M. White, and L.L. Korte

Released by: The University of Nebraska Agricultural Research Division

Characteristics: Holt is derived from an F₄ plant selected from the cross 'Sherman' x 'Harper'. It is an early maturity Group II cultivar with white flowers, gray pubescence, brown pods, and an indeterminate growth habit. Seeds are dull yellow with buff hila. In tests compared to 'Kenwood', Holt matured 2 to 3 days earlier, averaged 7 to 13 percent higher in yield, had better lodging resistance, shorter plant height, better seed quality, larger seed size, higher seed protein content, and similar oil content. Holt is susceptible to Phytophthora rot [*Phytophthora megasperma* f. sp. *glycinea* (Drechs.) Kaun & Erwin], pod and stem blight [caused by *Diaporthe phaseolorum* (Cke. & Ell.) Sak. var. *sojae* (Lehman) Wehm.], soybean mosaic virus, purple stain [caused by *Cercospora kikuchii* (T. Matsu. & Tomoyasu) Gardner], brown stem rot [caused by *Phialophora gregata* (Allington & Chaimberlain) W. Gams], and bacterial tan spot [caused by *Curtobacterium flaccumfaciens* pv. *flaccumfaciens* (Hedges) Collins & Jones].

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

Variety name: 'Lancaster'

Scientists: G.L. Graef, J.E. Specht, D.M. White, and L.L. Korte

Released by: The University of Nebraska Agricultural Research Division

Characteristics: Lancaster is derived from an F₄ plant selected from the cross K1047 x 'Mead'. It is a maturity Group III cultivar with purple flowers, tawny pubescence, tan pods, and a determinate growth habit (dt1dt1). Seeds are dull yellow with black hila. It matures 3 to 4 days later than 'Burlison', and averaged 12 percent higher yield than Burlison in irrigated tests in Nebraska. Compared with Burlison in regional tests, Lancaster has similar lodging resistance, shorter plant height, better seed quality, similar seed size, higher seed protein content, and similar oil content. It has excellent seedling emergence. Lancaster is heterogeneous for resistance to race 4 of Phytophthora rot [*Phytophthora megasperma* f. sp. *glycinea* (Drechs.) Kuan & Erwin]. It is moderately resistant to pod and stem blight [caused by *Diaporthe phaseolorum* (Cke. & Ell.) Sak. var. *sojae* (Lehman) Wehm.], and is susceptible to soybean mosaic virus, purple stain [caused by *Cercospora kikuchii* (T. Matsu. & Tomoyasu) Gardner], brown stem rot [caused by *Phialophora gregata* (Allington & Chaimberlain) W. Gams], and bacterial tan spot [caused by *Curtobacterium flaccumfaciens* pv. *flaccumfaciens* (Hedges) Collins & Jones].

Crop: Intermediate Wheatgrass
[*Thinopyrum-intermedium* subsp.
barbulatum (Schur) Barkw. & Dewey]
Variety name: 'Manska'
Scientist: J. Berdahl and K. P. Vogel
Released by: The USDA Agricultural
Research Service, the USDA Soil
Conservation Service, the North
Dakota Agricultural Research Divi-
sion, the University of Nebraska
Agricultural Research Division
Characteristics: High nutritive value
is the primary advantage of 'Manska'
over current intermediate wheatgrass
cultivars. It is recommended for
grazing and hay in regions of the
northern and central Great Plains
where annual precipitation averages
more than 350 mm (14 inches). No
data exist on long-term persistence
under grazing. Based on performance
of other intermediate wheatgrass
cultivars, maintenance of Manska at a
high stand density under grazing
would likely require prudent man-
agement to ensure adequate
fall-season recovery, especially when
stressed from drought or exposed to
high levels of winter stress in the
Northern Great Plains.

Crop: Hard Red Winter Wheat
[*Triticum aestivum* (L.) em Thell]
Germplasm release: N86L177
Scientists: C.J. Peterson, R.A.
Graybosch, P.S. Baenziger, D.R.
Shelton, W.D. Worrall, L.A. Nelson,
J.H. Hatchett, and D.V. McVey
Released by: USDA Agricultural
Research Service, Northern Plains
Area, and the University of Nebraska
Agricultural Research Division
Characteristics: Selected and released
as germplasm based on its superior
grain protein concentrations and
excellent bread-making qualities.
N86L177 is an awned, white-glumed,
short wheat. It is equal in height to
'Karl' with similar to slightly earlier
maturity. Its winterhardiness is better
than 'TAM-200' and slightly less than
Karl. It has moderately erect leaves,
very stiff straw, and is lower tillering
than commonly grown Nebraska
varieties. Its grain yield is superior to
'Redland' and 'Siouxland' under
conditions favoring high levels of
lodging. Its test weight is higher than
Redland or Siouxland, but less than
Karl.

Crop: Hard Red Winter Wheat
[*Triticum aestivum* (L.) em Thell]
Variety name: 'Vista'
Scientists: P.S. Baenziger, C.J.
Peterson, D.R. Shelton, L.A. Nelson, J.
Hatchett, D. McVey, P. Nordquist, R.
Elmore, J. Watkins, and D.
Baltensperger
Released by: The University of
Nebraska Agricultural Research
Division and the USDA Agricultural
Research Service, Northern Plains
Area
Characteristics: Vista is an awned,
white glumed variety, although it
may have a bronze cast in some
environments. The spike is mid-
dense and generally fusiform but
may be tapering to clavate. The
foliage is green with a waxy bloom at
anthesis. The glume is mid-long and
mid-wide to wide. The glume shoul-
der is mid-wide and sloping to
square. The beak is acuminate and
medium to moderately long. The
kernel is short, red colored, hard
textured, and elliptical to ovate. The
kernel has no collar, rounded cheeks,
mid-size germ, large brush, and a
narrow and shallow crease. Vista is
best adapted to the northern high
plains region. It is not recommended
for very dry wheat growing condi-
tions where its short coleoptile and
short plant height may cause seedling
emergence and harvest difficulties.
The test weight of Vista is similar to
'Arapahoe', less than 'Siouxland' and
'Rawhide', and superior to 'Redland'.
Vista has moderate resistance to leaf
rust, resistance to Biotype C and
some plants are resistant to Biotype B
of Hessian fly, and moderate to stem
rust. It is susceptible to soil-borne
mosaic virus.

Horticulture

Crop: Hubbard winter squash type
[*Cucurbita maxima*]

Variety name: 'Lakota'

Scientist: D. P. Coyne

Characteristics: Lakota is a small, decorative, high quality Hubbard squash. Fruit exhibit green and orange variegated patterns. It is a dual purpose squash that provides decorative value as well as excellent baking qualities. It is adapted to western Nebraska but should be planted in eastern Nebraska with care as it is susceptible to vine borer in eastern Nebraska.

Crop: Potato (*Solanum tuberosum* L.)

Variety name: 'Red Cloud'

Scientists: R. B. O'Keefe, A. D. Pavlista, and E. Dempsey

Characteristics: Red Cloud was developed from a cross of NE 185.57-1, a red cultivar from the Nebraska breeding program, and 'Superior', a white cultivar chosen for its scab resistance. Red Cloud has a lower incidence of hollow heart, vascular discoloration, and internal and external defects than accepted standards. It has thick, dark red skin and white flesh and maintains good color in storage. Its white flesh has a mealy texture. The primary market for Red Cloud is for fresh table potatoes for boiling, mashing and baking.

South Central Research and Extension Center

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

Germplasm release: MO/PSD-0259

Scientists: H. Minor, E. Brown, B. Doupnik, R. Elmore, and S. Simmerman

Released by: Missouri Agricultural Experiment Station and University of Nebraska Agricultural Research Division

Characteristics: Phomopsis seed decay is a resistant soybean germplasm. The line is short-statured with a determinate growth habit, purple flowers, gray pubescence, and brown pod walls.

West Central Research and Extension Center

Crop: Penstemon (*Cobaea* x *Penstemon Triflorus*)

Variety name: 'Prairie Splendor'

Scientist: D.T. Lindgren

Released by: University of Nebraska Agricultural Research Division

Characteristics: A seed propagated selection of *Penstemon cobaea* x *Penstemon triflorus* that was released for its large flower size and for its wide range of flower colors. It flowers for about three weeks during June.



Research Expenditures

ARD receives funding from federal formula funds, industry grants, federal grants and state appropriations. During fiscal year 1992-1993, faculty with ARD appointments obtained grant and contract funds that totaled \$20,750,355. This amount represents 28 percent of all grant and contract funds received by UNL and 53 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.

Report of Research Expenditures The University of Nebraska Agricultural Research Division July 1, 1992 through June 30, 1993

Federal Formula Funds:

Hatch Formula	\$ 2,185,273
Regional Research	\$ 817,490
McIntire-Stennis	\$ 134,401
Animal Health	\$ 219,969
Total Federal Formula Funds	\$ 3,357,133

State Appropriated Funds\$24,543,753¹

Contracts and Grants:

USDA Coop Agreements	\$ 2,302,465
USDA Special and Competitive	\$ 2,467,842
Federal Grants — (NSF, NIH, HEW, AID)	\$ 3,383,797 ²
Industry Grants	\$ 4,150,145
Total Grants and Contracts	\$12,304,249
Sub-Total	\$40,205,135

Product Sales\$ 5,687,794

Total Expenditures\$45,893,929

¹Includes \$2,802,804 of Nebraska Research Initiative funds expended by ARD affiliated units.

²\$557,912 was included to show actual Agricultural Research Division expenditures reflecting transfers from International Programs.

Agricultural Research Division Selected Research Program Information

Category	FY 1991	FY 1992	FY 1993
Project Information:			
Projects at beginning of year	259	293	335
Projects terminating	45	29	40
Projects revised	5	5	14
New projects	79	71	56
Projects at the end of the year	293	335	351
Faculty full-time equivalents (FTE)	144.5	139.4	135.7
Support for budgeted research faculty:			
Federal formula and state approp./FTE ¹	\$178,901	\$192,087	\$205,607
Grant and contract expenditures/FTE	\$ 65,857	\$ 76,825	\$ 90,672
Product sale expenditures/FTE	\$ 41,919	\$ 46,317	\$ 41,914
Outputs from research program:²			
Refereed journal articles	255	272	277
Research bulletins	4	6	3
Books and book chapters	48	44	49
M.S. and Ph.D. theses	109	114	129
Cultivars and germplasm released	17	11	14
Patents obtained	1	3	0

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

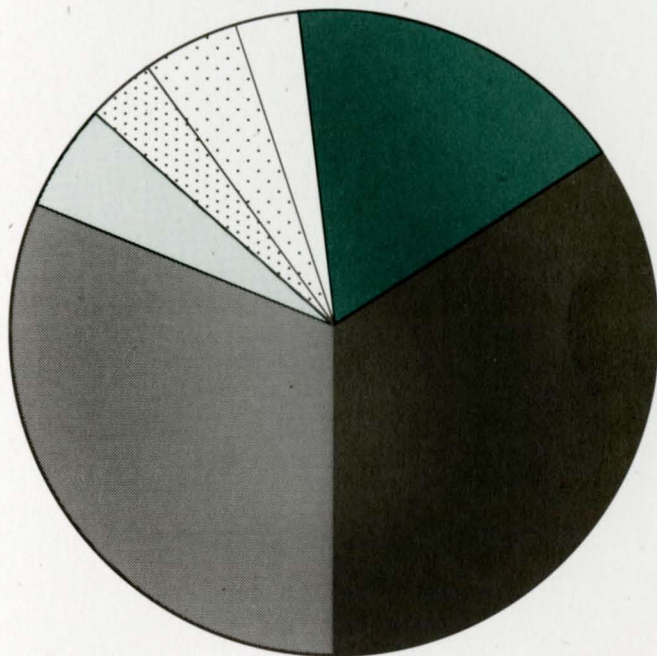
²A large number of abstracts, technical reports, and other non-refereed articles also are published by faculty each year.








Agricultural Research Division
Research Investments By Category and Funding Source FY 1993

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	5.2	4.1	0.8	24.9
Managerial/Professional	11.4	9.1	7.2	4.5	9.6
Office/Service	14.5	7.0	12.9	21.2	14.1
Hourly Wages	0.6	5.3	11.1	4.8	3.1
GRA Stipends	5.5	18.7	16.2	1.3	8.1
Benefits	14.5	7.8	8.2	7.0	11.7
Subtotal:	<u>86.3</u>	<u>53.0</u>	<u>59.6</u>	<u>39.6</u>	<u>71.6</u>
Operating					
Supplies and Expenses	9.4	31.6	24.9	50.2	20.3
Travel	0.7	4.5	7.5	3.1	2.4
Equipment	3.6	10.8	7.9	7.1	5.7
Subtotal:	<u>13.7</u>	<u>47.0</u>	<u>40.4</u>	<u>60.4</u>	<u>28.4</u>
Total:	100.0	100.0	100.0	100.0	100.0

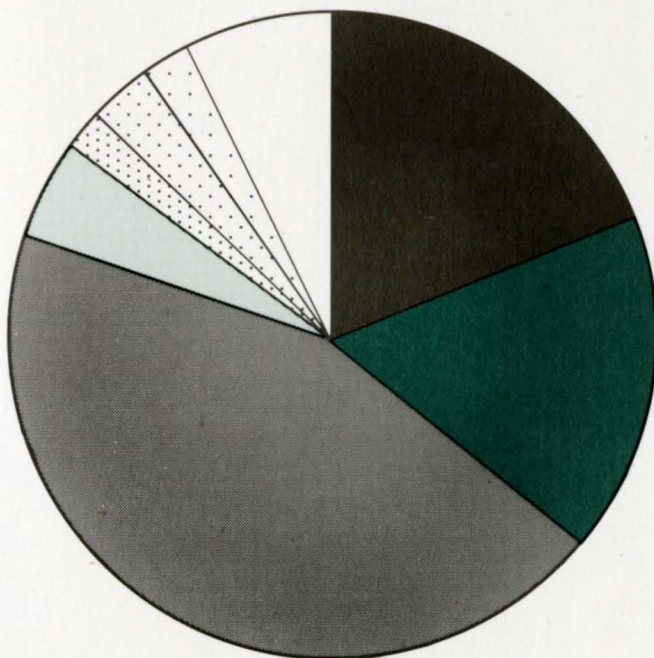
Agricultural Research Division Programmatic Distribution of Investments¹










I. Classification by Research Program Area



	Natural Resources	20.4%
	Crops (field and horticulture)	35.2%
	Animals (including invertebrates)	28.7%
	People and Communities	6.3%
	Trade and Policy	2.9%
	Food and Nutrition	3.7%
	Other Technology	2.7%

II. Classification by Research Goal



	Goal I. Wise management of natural resources	20.0%
	Goal II. Protect from pests	21.2%
	Goal III. Ensure adequate supply of food	35.4%
	Goal IV. New products and improved processes	6.2%
	Goal V. Increase marketing efficiency, and	
	Goal VI. Expand export markets	1.8%
	Goal VII. Protect health and improve nutrition	3.6%
	Goal VIII. Improve quality of life in rural areas	2.7%
	Goal IX. Promote community improvement	9.3%

¹Product sale income is not included in the totals.