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Agricultural Research Division 111th Annual Report 1997

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On the cover: Sunrise in the Sandhills is part of the beauty of life in Nebraska. Agricultural Research Division scientists work from one end of the state to the other to contribute to Nebraska’s economy, environment and quality of life. Some of the work is done in laboratories; other work is done in fields, feedlots, yards and gardens. ARD scientists’ work takes them to many different places as they seek answers to Nebraskans’ concerns. On the back cover, fiber extraction units test the quality of forage, and a sunflower blooms in garden glory. Sunrise photo by Marianne Beel; forage photo by Mark Hansen; sunflower photo by Carson Fiske.
Our Mission

The mission of the Agricultural Research Division in the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln is to conduct problem-solving and fundamental research that addresses priority issues facing Nebraska’s agricultural and food industries; provides the knowledge base essential for managing our natural resources; promotes family well-being and community development; and educates future scientists through hands-on experiences.
It is a pleasure to provide you with the 111th Annual Report of the University of Nebraska Agricultural Research Division (ARD). Once a year we take the opportunity to assess what has been accomplished by our faculty, students, and staff during the past twelve months. In looking at the report, one cannot help but be impressed with the increasing outputs from our research program, but more important is the new technology and knowledge provided to Nebraskans to improve the profitability and competitiveness of their enterprises, to enhance the environment, and to improve their quality of life.

This report provides some highlights of research accomplishments, a listing of our scientists and research associates, outputs from our research projects, awards received by faculty and graduate students, and the ARD financial report for the period July 1, 1996 to June 30, 1997. 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.

ARD faculty conduct both fundamental and applied research. Fundamental research is undertaken to provide knowledge that will be useful in solving problems that may arise sometime in the future. An example of some fundamental research currently underway by ARD is the biochemistry of carbon dioxide fixation during photosynthesis. A better understanding of carbon dioxide fixation may lead to significant improvements in plant yields at some point in the future.

Applied research is conducted to provide solutions to current problems of clientele. An example of applied research is minimizing the impact of *E. coli* O157:H7 contamination of meat. Our scientists are studying new detection methods for *E. coli*, effects of *E. coli* on animal health, management techniques to minimize shedding of *E. coli* by animals, and ways of handling and preparing meat products that will protect human health.

Educating the next generation of scientists is an essential part of our research program through involvement of graduate students in almost all of our projects.

We are proud of our research program and the scientists who work diligently every day to provide the new knowledge essential to maintaining our standard of living and quality of life. We welcome your input about research needs and questions about our programs.

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

Disease sleuths identify virus

When a previously unknown disease attacked Plains states’ cornfields in 1993, IANR plant pathologists moved quickly to identify, characterize and track the offender.

Now known as high plains virus (HPV), its sudden prevalence in the world’s corn and wheat growing regions sparked an urgent need for knowledge of the disease. A network of researchers centered in NU’s plant pathology department and spreading through the Plains states has created a well-defined HPV portrait.

By 1995 HPV was identified in 100 counties in 10 states, as well as in Chile, Brazil and Israel. NU scientists believe HPV probably has been around for a long time but was mistakenly identified.

After an IANR virologist identified HPV, NU pathologists developed an antiserum that can be shipped to researchers anywhere as a simple way to positively identify the virus.

The outlook for controlling HPV in corn is hopeful. NU plant pathologists and a former IANR agronomist have found two different genes for HPV resistance in corn breeding lines. This is the first crucial step in developing corn hybrids resistant to HPV.

IANR researchers continue studying HPV to provide basic information needed to combat it.

Kit helps track corn rootworm beetles’ insecticide resistance

A diagnostic kit developed by IANR entomologists gives quick answers to a crucial question: are corn rootworm beetles from a specific field resistant to methyl parathion insecticide?

Entomologists can bring beetles from the field, place them in glass vials coated with insecticide and have an answer to the question in four hours. In 1996, researchers used this method to map the extent of the beetle resistance problem that first turned up in Nebraska two years earlier.

Researchers pinpointed two problem areas, centered around Phelps and York counties, where beetles showed resistance to methyl parathion and carbaryl insecticides. They are conducting soil insecticide trials in the two counties to determine whether the larvae, the damaging immature stage of the insect, will develop resistance as the adult beetles did.

Preliminary results of an IANR laboratory study tracing the biochemistry of the two beetle populations’ resistance mechanisms indicated they are not the same. Ongoing work will show which insecticides are still effective in which populations.

Wheat gluten could help print textiles

Wheat gluten, the protein that gives bread dough its elastic quality, may be used to print the pattern on your bed.
In order to be used in the color printing process, wheat gluten, like this sample, is chemically processed, stretched and dried, ground into a fine powder and mixed with pigment print paste.

sheets, thanks to the work of an IANR textile chemist.

Chemically-modified gluten, used as a binder in pigment print paste, has potential to replace or be used in conjunction with commercial binders. Wheat gluten comes from a renewable resource and is competitively priced.

The textile industry uses about 8 million pounds of petroleum-based binder for printing fabrics each year.

Eighty percent of printed fabrics in the United States are made with pigment print paste, a mixture of pigment, binder and thickener. Binders act like glue, sticking the pigment to the fabric.

The NU College of Human Resources and Family Sciences researcher modified gluten by the same patented process paper printers use. She added sodium hydroxide solution, methyl acrylate and hydrochloric acid to powdered gluten, creating a gummy mass.

The gluten is dried, ground into a fine powder, mixed with pigment print paste and applied to fabric. Printed fabrics are run through a battery of tests to determine whether they meet textile industry standards. The gluten binder passes all tests so far.

**NU varieties grow on more than 3/4 of state’s wheat acres**

NU-developed winter wheat varieties grow on more than three-fourths of Nebraska’s 2 million wheat acres, according to the 1997 Nebraska wheat survey.

The 1.5 million acres in wheat varieties developed by the IANR and USDA Agricultural Research Service wheat improvement team at NU is the highest total in recent years. Wheat breeders credit the higher numbers to the success of recently released NU varieties. Alliance, released in 1993, and Niobrara, released in 1994, were grown on 13.8 percent of the wheat acreage, up from 4.1 percent in 1996. Arapaho, a 1988 release, remains the favorite, grown on 30.1 percent of wheat acres.

Planting NU-developed varieties boosts growers’ earnings by more than $40 million annually, while the state’s millers and bakers benefit from NU cereal chemists’ work determining varieties’ bread-making qualities.

**Strategy to restore degraded rangeland**

A reclamation strategy for leafy spurge-infested grassland developed at NU shows promise for creating a lush native grass stand and high hay yields as early as the second season after planting.

Leafy spurge is a major rangeland threat, degrading pastures and reducing hay yields. A USDA-Agricultural Research Service scientist’s efforts are yielding a strategy that combines herbicide application, prescribed burning and planting native grasses to defeat leafy spurge and produce high quality pasture.

Degraded rangeland near Ansley, where the predominant plant species were Kentucky bluegrass, smooth bromegrass and leafy spurge, was sprayed with Roundup and Plateau herbicides to kill existing vegetation. Plateau probably will be labeled for this use no later than 1999.

The following spring, plant residue was burned off and big bluestem, Indiangrass and switchgrass were seeded directly into the sod.

Three years after planting, thick stands of big bluestem and switchgrass covered the rangeland. Researchers harvested 5,000 pounds of dry matter per acre, compared to 1,200 pounds from the Kentucky bluegrass-leafy spurge pasture. The native grass also is higher-quality forage.

Establishing a solid stand of big bluestem cost about $150 per acre, but by the first year after planting researchers were able to recoup about $120 per acre from hay yields.

**Team monitors Nebraska’s winds**

A wind energy industry seems like a natural fit for breezy Nebraska, but its success would depend on the right amount of wind at the right time.

An IANR agricultural meteorologist is part of a team monitoring winds across the state to find out whether this natural resource can be economically harnessed.

In 1995 the Nebraska Wind Energy Task Force, a joint effort of public and private groups, started a four-year project to monitor Nebraska
winds and quantify where good power generating sites might be.

The meteorologist collects daily data fed in from computers at eight study sites across Nebraska, archives the information and makes it available to the public. NU researchers are using the data to develop a computerized map to provide better wind estimates for locations that haven't been monitored.

Computers record wind speeds at heights of 33, 82 and 130 feet, wind direction, air temperature and solar radiation. After one year's data, Valentine won honors as the windiest site. Average wind speed: 16.8 mph.

Wind energy is renewable and environmentally friendly, and could eventually supply up to 20 percent of the electricity Nebraskans need.

Vacuum treatment rids plants of bugs

Growers of cut flowers and potted plants someday may have an alternative to expensive, unpleasant pesticides to control greenhouse pests.

Two IANR horticulturists and a biological systems engineer combined vacuum infiltration with soap solutions to kill white flies and aphids, two of the most common greenhouse pests.

Their method literally blows insects up like balloons and pops them. It's not exactly a kinder, gentler pesticide for bugs, but it's definitely safer and more pleasant for people.

Researchers submerge bug-infested chrysanthemum or poinsettia stems in a soap solution, place them in a vacuum chamber and draw a vacuum. The vacuum draws the gas from the insects' bodies. When the vacuum is released, the solution rushes in to fill the insects' cavities. The insects expand until they rupture.

The plant undergoes the same process of cell expansion as the insects, but plant cells are more elastic and don't rupture. Plant cuttings researchers tested have rooted and grown out normally.

The team thinks the vacuum treatment has potential in the greenhouse industry. The technology is readily available and fairly inexpensive. Big vacuum chambers have been used in the food industry for 35 years, so they should be economically feasible for large growers.

Study examines lawn compost for pesticide residues

As more communities compost lawn waste, questions arise about lawn pesticides becoming an ingredient in the finished product.

NU research shows Lincoln gardeners needn't worry about the safety of their municipal compost.

An IANR pesticide residue researcher and a research technologist tested lawn waste compost from Lincoln's municipal recycling program for 24 pesticides. They found residues of eight, but only one was in amounts greater than the health-based screening values (HSV) used to determine risk. That pesticide, dieldrin, barely exceeded the HSV.

Researchers say Lincoln’s compost is safe to use and adding it to garden soil may even help reduce the pesticide concentrations already there by diluting them.

The researchers found DDT, DDE, DDD, chlordane, heptachlor epoxide, dieldrin and endrin in the compost. These compounds haven't been used for years but can be persistent in soil. Researchers believe the pesticides came from previously treated soil that was part of lawn waste added to compost.

Most of the pesticides commonly used on lawns today, such as 2,4-D or diazinon, weren't found in compost.

Composting turns waste to fertilizer

Feedlot waste can become valuable fertilizer through a simple, environmentally friendly composting process, IANR research shows.

Composting beef feedlot
manure transforms it into a soil-enriching fertilizer while reducing fly and odor problems. The process kills weed seeds and disease-causing organisms and creates a final product that is easier to apply to fields, researchers found in a three-year study at IANR's Integrated Farm Project.

Researchers composted manure generated at NU's Agricultural Research and Development Center beef feedlot near Mead. Manure was windrowed and windrows were turned four to six times during summer. In 1996 they composted more than 1,000 tons of manure.

Compost was applied to fields before planting crops, using a manure spreader and a rate of 10 tons per acre.

Compost primarily was applied as a phosphorous source, but it also adds nitrogen, potassium and organic matter to soil. Compost improved yields, with increases ranging from 3 to 12 percent for different crops.

Composting waste requires careful management and additional labor, equipment, time and money. This research shows composting costs from $3.75 to $6 per ton, but producers can estimate nitrogen and phosphorous in the compost are worth anywhere from $5 to $8 per ton.

**Meat tenderness may be a blast**

An explosive new technology may become the wave of the future for tenderizing meat.

The Hydrodyne process uses an explosive charge to instantly tenderize meat for pennies per pound.

IANR meat scientists have teamed with USDA researchers and Hydrodyne Inc., private developer of the process, to explore its commercial potential.

Vacuum-packed meat is placed in a stainless steel bowl in the Hydrodyne unit, a large steel bell jar. Detonating a small explosive suspended above the meat creates supersonic shock waves that travel through the meat. These shock waves create very tiny tears in the meat that tenderize it.

IANR research aims to understand specifically how this process works and to identify any barriers to transferring the technology to the meat industry.

**Vet scientist seeks clues to syndrome**

Sudden Death Syndrome (SDS), a costly and all-too-common problem in large beef feedlots, has been mystifying researchers for 25 years.

Cattle in the final stages of finishing drop dead without any sign of problems — a total loss for the feedlot operator.

Searching for clues to this mystery, an IANR veterinary scientist studied tissues from 30 steers whose deaths matched the SDS scenario. He believes SDS is mainly a nutrition problem, resulting from erratic intake of rations with a high grain content.

The profile of a typical SDS case is a steer in a large feedlot with as many as 30,000 other cattle. The steer eats a ration that’s 80 percent or more grain and its consumption is erratic.

Of the 6,600 cattle in the NU study, 30 died of SDS during a 102-day period. This represents a serious problem. In a feedlot with 30,000 head, 466 head per year would be lost to SDS.

Based on this work, the scientist postulated that death may be caused by a combination of endotoxemia and bloat, cattle digestive conditions associated with overeating. He ruled out primary infectious diseases as an SDS cause.

**Summer calving saves money, work**

Moving calving from March to June lets cow-calf operations save on feed and labor costs and cuts weather-related problems and ranch family workloads. IANR research shows.

Traditional March calving means ranchers must feed hay to lactating cows, when their nutritional needs are greatest. Moving calving to June means cows can instead graze wet meadows and upland pastures when the grass is at its peak nutrient content.
In 1996 a beef nutritionist and an agricultural economist from NU’s West Central Research and Extension Center at North Platte completed the third of a five-year study of summer-calving economics and reproduction. They bred, grazed and calved 165 cows at NU’s Gudmundsen Sandhills Laboratory near Whitman.

Compared to spring-calving counterparts that each consumed 2,800 pounds of harvested native grass hay, summer-calving cows required no hay, trimming $12,400 from feed costs.

Eliminating hay saved $45 per ton on grass hay, plus about $10 per ton for labor, tractor expense, depreciation and fuel for feeding.

Ranchers won’t completely eliminate haying. They might need hay for weaned calves or to feed cows if winter range is snow- or ice-covered.

Marketing calves is the most critical economic component of this system. Summer-born calves are about 60 pounds lighter than spring calves and enter the cattle market at off-season times. Researchers say that may be an advantage.

**Turfgrass seed may be Panhandle crop**

Certified turfgrass seed has potential as a high-value crop for Nebraska’s Panhandle.

Western Nebraska’s climatic and production conditions are ideal for growing and harvesting certified turfgrass seed, IANR scientists say.

Last summer, producers harvested 300 acres of Kentucky bluegrass from Panhandle fields that typically raise corn, dry edible beans or wheat.

IANR scientists are conducting research to help growers maximize the region’s turf seed production potential. Researchers at NU’s Panhandle Research and Extension Center at Scottsbluff and turf scientists based in Lincoln have teamed on this NU Center for Grassland Studies project.

Turfgrass seed is a perennial crop, planted one year and harvested the next. It builds organic matter in the soil and provides protection against water and wind erosion.

IANR research focuses on defining fertility programs for turfgrasses, analyzing planting dates in test plots and comparing Kentucky bluegrass, tall fescues and perennial ryegrasses in variety trials. Test plots near Scottsbluff, Sidney and Alliance provide visual and production data. A 17-variety bluegrass fertility trial planted on a seed producer’s farm gives full-scale comparisons under field production practices.

**Weed maps reveal a patchy problem**

Farmers know weeds are scattered nonuniformly across fields, but they’ve historically lacked information to accurately scout and manage this patchiness. Instead, they’ve had to apply herbicides uniformly across fields.

IANR weed scientists harnessed Global Positioning System and Geographic Information System technologies in research to improve weed scouting methods and help farmers save money and chemicals by treating only weeds that threaten crop yields. Using GPS to guide them to specific spots in fields, researchers intensively counted and mapped weed distribution and density in more than 40 fields since 1991. They use GIS to combine the weed information with other site-specific data about the fields to create detailed weed distribution maps.

This research has greatly expanded understanding of weed distribution and growth patterns in typical farm fields.

Results show weed distribution is indeed patchy. About 30 percent to 60 percent of a typical farm field requires no herbicide treatment. Researchers found through simulations that using maps to make post-emergent...
herbicide application decisions could reduce herbicide use 30 percent to 60 percent. That would amount to a $360-$720 savings on an 80-acre soybean field.

**Researcher hopes to unlock secrets to fungi-resistant plants**

When a spore from a disease-causing fungus lands on an alfalfa leaf, an intricate chemical conversation takes place that determines whether the plant becomes infected.

An IANR plant pathologist believes interpreting this complex interplay of signals could be a key to unlocking novel ways to develop disease-resistant alfalfa plants.

Developing alfalfa plants resistant to anthracnose, a fungal disease, is one research focus. His broader interest is how fungi cause plant diseases and how plants defend themselves against fungi.

The researcher thinks genes and the proteins they code for are the signals in plant-fungus communication.

Using genes known to control animal cell-signaling tasks as guides, this IANR team searched for similar genes in the fungus that causes anthracnose. They located a previously unknown gene and named it TB3. Then they cloned the gene so they could test whether it performs signaling functions similar to those in animal cells.

They believe that TB3 could be a genetic switch that could be used to interrupt the communication between fungus and host plant, turning off the alfalfa anthracnose infection process.

**New tests help allergic consumers**

NU research literally could be a lifesaver for people with food allergies. IANR food scientists are developing faster, more accurate tests to detect traces of allergens in processed foods.

Their research already has produced powerful, highly sensitive ELISA tests for peanuts and casein, a milk component, and egg. New tests for soybeans, whey and tree nuts are in the research pipeline. They are working with a private company to commercialize these tests.

The new tests are faster, more accurate and less expensive than tests the team previously used to detect food allergens. The older tests have several drawbacks and require three days’ lab work compared to one day with the new tests.

Detecting and eliminating cross-contamination — allergenic food residue that contaminates another food processed on shared equipment — is a major concern for industry. NU’s program is one of the few nationwide focusing on food allergies from a food industry perspective.

The team works closely with the food industry through NU’s Food Allergy Research and Resource Program, which they established in 1995, to assure they’re tackling the most pressing needs. Member companies share test development costs. The program strengthens the NU scientists’ industry linkages, reduces duplication and uses research capabilities more efficiently to protect allergic consumers.

**Vegetation strips along waterways help prevent runoff**

Vegetation called riparian strips, planted along streams and rivers, significantly reduce fertilizer, pesticide and sediment runoff from fields, IANR research shows.

Riparian strips aren’t new in parts of the United States, but NU Forestry, Fisheries and Wildlife researchers are working to determine how best to adapt riparian strips to the Midwest. They’ve established riparian strips at NU’s Agricultural Research and Development Center near Mead where they’re studying the best widths and types of vegetation for the region.

They found that newly-planted buffer strips provide almost immediate water quality protection and reduce total runoff volume by 61 percent. Well-established buffer strips reduce runoff volume by as much as 99 percent.

Nationwide, recommendations suggest 50-foot buffer strips, but this NU research indicates 50-foot widths might work well in the Midwest and be more attractive to farmers.

**Researchers seek to cut pollution in Blue River basins**

NU and Kansas State researchers have teamed for research aimed at reducing surface water pollution in southern Nebraska’s Big and Little Blue River basins.

Runoff into these rivers contains atrazine and sediments that affect the quality of water,
which ultimately becomes a major drinking water source downstream in Kansas.

Researchers are evaluating best management practices landowners could adopt to reduce runoff and pollution. They’re also assessing the costs of implementing these practices on agricultural land in the 7,200 square-mile area of Nebraska included in the project.

Research findings will become the basis for education and demonstration projects to help landowners adopt these water quality protection measures.

Strategies to work with abusive men

Intimate partner abuse is a daunting, nationwide problem. There’s no easy solution, but an NU family scientist’s research is yielding new ethics-based strategies for working with abusive men.

This researcher developed intimate justice theory, a theoretical framework focusing on ethical dimensions of intimate partnerships. It incorporates nine related concepts describing ethical dimensions of equality, fairness and caring in ongoing intimate partnerships.

Building on this theory, the team has developed numerous therapeutic interventions, or approaches, and specific techniques that provide practical therapy tools for those who work with abusive men.

These tools are based on research and separate interviews and counseling with abusive men and their partners. Some interventions grew from the NU College of Human Resources and Family Sciences team’s frustrations about getting abusers to talk self-reflectively about their behavior.

They devised new techniques to challenge abusers to examine their actions’ ethical dimensions, such as establishing the abuser’s accountability/responsibility for change and for his behavior, challenging his sense of entitlement, helping him rethink what respect is and restoring freedom to his partner.

Researchers point out that abusers and abused partners need far different therapeutic interventions. In the context of the abuse, abusers are the problem, not their partners. Protecting the abused partner’s safety is a primary concern throughout therapy.

Huge increase in ag productivity in last half century

Nebraska’s agricultural productivity increased by 80 percent in the last half century. That’s among the findings of an IANR agricultural economist’s study that measured productivity and other economic changes in the state’s agriculture from 1936-1996.

Nebraska’s actual agricultural production, or total agricultural output, tripled during this period. Increased productivity accounted for two-thirds of the agricultural production increase while one-third was attributed to agricultural production inputs. Productivity increases production without increasing inputs needed for the production.

Using fewer resources to produce an agricultural commodity keeps production costs down and keeps Nebraska competitive in a world market. Today, about 30 percent of Nebraska agricultural products are exported, compared with 10 percent 50 years ago.

Process to produce anti-botulism vaccine

The technology to produce vaccines that someday could protect American soldiers during biological warfare is being developed in an IANR laboratory.

An IANR biochemist engineer who heads NU’s Fermentation Facility is working to develop a process to produce vaccines against botulism, a deadly neurotoxin used in biological warfare.

Working under contract with the U.S. Army, this research team is developing the entire process for making the vaccine. They’re using fermentation and protein purification expertise as well as experience gained while helping other NU researchers and biotechnology companies.

Botulism, a severe food poisoning, is caused by the bacterium Clostridium botulinum. During unsafe storage and canning conditions, C. Botulinum spores germinate and grow, producing the botulism neurotoxin. In biological warfare, bombs or missiles deliver the botulism toxin that can kill unprotected soldiers.

No C. botulinum bacteria or toxin will be at NU. The IANR team’s job is to develop the process and transfer it to Walter Reed Army Medical Center, which is federally authorized to make human-injectable vaccines.

This work eventually should yield anti-botulism vaccines the military can use to protect American soldiers.

Mike Meagher, a biochemical engineer in NU’s department of food science and technology and biological systems engineering, is working under a contract from the U.S. Army to produce the technology necessary to make botulism vaccine.
**A few more glimpses at ARD research...**

- NU soybean breeders are developing specialty soybeans for human and industrial uses along with high-yielding conventional varieties well-suited to Nebraska’s growing conditions. IANR plant breeders have released 13 new soybean varieties since 1991. These newcomers are estimated to be worth more than $60 million annually to Nebraska soybean growers. During the same period, IANR’s soybean team also released eight germplasms and two high protein soybean lines. The germplasm releases are used as parents by private companies and other universities in their variety development efforts.

- Miscarriage can have devastating and far-reaching effects, NU research shows. In the latest study in more than 20 years of groundbreaking research on infant deaths’ impact on families, an IANR family scientist analyzed responses from mothers and fathers who experienced miscarriage. He found that while society typically minimizes miscarriage, 94 percent of those interviewed see themselves as grieving parents. About 67 percent of parents felt personal guilt while 33 percent blamed someone else. These and other findings should help medical professionals and others better understand miscarriage’s impacts and more effectively respond to those who experience miscarriage.

- Anglers who enjoy landing trout at Lake Ogallala should benefit from IANR fisheries research at the lake. Scientists implanted transmitters in some of the lake’s trout and tracked them to better understand the game fish’s movements, and habitat and water quality needs. Results are helping the Nebraska Game and Parks Commission create a successful management plan to improve fishing and maintain a diverse ecosystem after the lake is renovated.

- Nebraska agricultural land values jumped 7.6 percent in 1996, reflecting the second largest hike in a decade of increasing ag land values. This and other information about ag land values comes from NU’s annual Nebraska Farm Real Estate Market Survey. IANR agricultural economists have conducted the survey annually for the past 20 years to provide information on trends in land values and cash rental rates over time.

- Knowledge gleaned in an IANR veterinary science lab someday could yield better diagnostic tests and perhaps a vaccine against Johne’s disease, a growing cattle industry threat. With the help of molecular biology techniques, a veterinary scientist is studying the bacterium that causes Johne’s. Understanding the organism’s basic biology is a crucial step in developing vaccines as well as tests that detect the disease earlier and more effectively. That’s important because current testing tools limit early detection. Cattle can be infected for a long time before showing the disease. Johne’s is fatal to beef and dairy cattle but is hard to detect, impossible to cure and easily spread. Some studies estimate 10-40 percent of U.S. dairy herds have some infected animals. Many beef herds also are infected.

- Windstar, a new hard red winter wheat variety developed by IANR and USDA-Agricultural Research Service wheat breeders at NU, out-shines other wheats in dryland production. Made available to growers in fall 1996, Windstar showed consistently high yields in the Panhandle and performed well in southwest and south central Nebraska. It is a taller semi-dwarf wheat with moderate resistance to stem rust disease.

- Cattle producers worried that winter grazing of sorghum and corn stalks might hurt their soil, ridges, residue cover or next season’s yields can relax. A three-year IANR study of conventional and ridge-till cropping systems found that grazing won’t damage ridges or reduce yields in either system, and soil compaction isn’t a problem if cattle are taken off very muddy fields.

- IANR research confirms that adding an organic polymer called polyacrylamide, or agricultural PAM, to irrigation water can reduce soil erosion in irrigation furrows. PAM virtually binds soil particles together, clumping particles in place and reducing sediment flow down the furrow. An irrigation engineer at NU’s Panhandle Research and Extension Center at Scottsbluff found that PAM reduced sediment runoff by about 90 percent. PAM, which costs about $5 per acre per application, is most effective when added directly to irrigation water.

- Cattle feeders can safely add up to 10 percent cull dry beans to cattle rations. Research at NU’s Panhandle Research and Extension Center at Scottsbluff shows that steers fed rations containing 10 percent beans out-performed those fed 5 percent beans or those on a conventional diet. Steers on the 10 percent bean ration had the best weight gains and feed efficiency in a 1996 trial. Split or cracked great northern, kidney and pinto beans contain up to 24 percent crude protein, little fat and are a good energy source for 600- to 1,000-pound cattle in the growing phase.
The impact and quality of ARD research can be assessed in many ways. One measure of excellence is the recognition researchers' work receives from peers and from those who benefit from the research. A number of ARD faculty members are widely recognized as leaders in their disciplines, and a number received international, national, regional and/or state honors in the past year for their scientific contributions.

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

**Agricultural Economics**

Dennis Conley received an award for significant contributions from the International Food and Agribusiness Management Association.

Sam Cordes received the Distinguished Research Award from the National Rural Health Association.

**Agricultural Meteorology**

Kenneth Hubbard received the 1996 IANR Team Effort Award for the Nebraska Dry Edible Bean Improvement Team, University of Nebraska, Institute of Agriculture and Natural Resources.

**Agronomy**

David J. Andrews received the King Baudouin Award for International Achievement in Pearl Millet Research (Team Award) from the Consultative Group on International Agricultural Research, Washington, D.C.

P. Stephen Baenziger was elected to membership in the Nebraska Hall of Agricultural Achievement.

Kenneth Cassman received the Fellow Award from the American Society of Agronomy.

Steven D. Comfort received the Junior Faculty Recognition for Excellence in Research Award from the Agricultural Research Division.

Martin A. Massengale received the DeKalb Crop Science Distinguished Career Award from the Crop Science Society of America and the IANR Initiative Team Award from the Institute of Agriculture and Natural Resources.

Jeffrey F. Pedersen received the Fellow Award from the American Society of Agronomy.

Roy F. Spalding received recognition in appreciation for Exemplary Service in Fostering Excellence in Research as a member of the Research Advisory Board from the National Water Research Institute.

James E. Specht received the Crop Science Research Award from the Crop Science Society of America, the Research Award from Sigma Xi, University of Nebraska-Lincoln Chapter, and the Soybean Production Research Award from the American Soybean Association.

Wallace Wilhelm received the Fellow Award from the American Society of Agronomy.

**Animal Science**

Elton D. Aberle received recognition as past president of the American Society of Animal Science.

Mary M. Beck received recognition as secretary-treasurer of the Poultry Science Association.

Chris R. Calkins is President of the American Meat Science Association.

James E. Kinder is President of the Nebraska Chapter of Sigma Xi.

Terry J. Klopfenstein received a plaque in recognition of his research contributions in the feedstuffs area from the U.S. Poultry and Egg Association.

Mark Morrison received the Junior Faculty Recognition for Excellence in Research Award from the Agricultural Research Division.

Steven D. Comfort received the Junior Faculty Recognition for Excellence in Research Award from the Agricultural Research Division.
Mark Morrison received the Junior Faculty Recognition for Excellence in Research Award from the Agricultural Research Division.

L. Dale Van Vleck received the Research Award of Merit from Gamma Sigma Delta, University of Nebraska-Lincoln Chapter.

Biological Systems Engineering

Aristippos Gennadios received the Innovative Use of Glycerine Award from the Soap and Detergent Association.

Milford A. Hanna received the Innovative Use of Glycerine Award from the Soap and Detergent Association.

Michael F. Kocher received the Superior Paper Award from the American Society of Agricultural Engineering.

LaVerne E. Stetson received the Technology Transfer Award from USDA/ARS and was elected Fellow of the Institute of Electrical and Electronic Engineers from the Institute of Electrical and Electronic Engineers.

Curtis L. Weller received the Innovative Use of Glycerine Award from the Soap and Detergent Association.

Horticulture

Dermot P. Coyne received the IANR Team Effort Award for the Nebraska Dry Edible Bean Improvement Team, University of Nebraska, Institute of Agriculture and Natural Resources; the Vegetable Genetics and Breeding Research Award of Excellence from the Vegetable Breeding Working Group of the American Society for Horticultural Science; and the Fellow Award from the American Agronomy Society from the Crop Science Society of America.

Duward A. Smith received the IANR Team Award for the Nebraska Dry Edible Bean Improvement Team, University of Nebraska, Institute of Agriculture and Natural Resources.

Plant Pathology

James R. Steadman received the IANR Team Effort Award for the Nebraska Dry Edible Bean Improvement Team, University of Nebraska, Institute of Agriculture and Natural Resources.

Veterinary and Biomedical Sciences

John A. Schmitz was elected to Membership in the Nebraska Hall of Agricultural Achievement.

Eva Wallner-Pendleton received the Nebraska Poultry Industries' Person of the Year Award.

Family and Consumer Sciences

Brian L. Jory received the “Best of '95” at the Annual Conference of the American Association of Marriage and Family Therapists.

West Central Research and Extension Center

Dale T. Lindgren received the Distinguished Service Award from the Nursery and Landscape Association; the IANR Team Effort Award for the Nebraska Dry Edible Bean Improvement Team, University of Nebraska, Institute of Agriculture and Natural Resources; and the Award of Merit from the Federated Garden Clubs of Nebraska.

Water Center/Environmental Programs

Shripat L. Kamble received an IR-4 Meritorious Service Award from the North Central Regional IR-4 Program.
One of the primary missions of the ARD research program is to develop the scientists of tomorrow. We are committed to providing exceptional graduate students with the opportunity to work with and learn from our research faculty.

ARD is among the national leaders in research in food production and processing, natural resources management and family sciences. Approximately 730 graduate students are pursuing advanced degrees with ARD faculty. The quality of our graduate students is reflected in the recognition they receive.

Agronomy

Daniel D. Beran received the Arthur William Sampson Fellowship in Pasture and Range Management from the Center for Grassland Studies.

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

John L. Lindquist received the Hardin Distinguished Graduate Fellowship from the Agricultural Research Division and the Outstanding Graduate Student Award from the Weed Science Society of America.

Victor Vidal-Martinez received the Pioneer International Scholarship from Pioneer Hi-Bred International, Inc., Johnson, IA.

Terence Molnar received the Charles C. Cooper/Emma I. Sharpless Fellowship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division and the Biotechnology Graduate Research Fellowship from the Center for Biotechnology.

Carlos Nieto C. received the Graduate Student Research Fellowship from the Nebraska Statewide Arboretum.

Richard K. Olson received the Presidential Graduate Fellow Award from the Elmer C. Rhoden Scholarship Fund, University of Nebraska Foundation.

John Ortman received the J.E. Weaver Small Grant Award from the Nature Conservancy.

Claudio Perez received the J.E. Weaver Small Grant Award from the Nature Conservancy and the research grants-in-aid for graduate students from the Center for Great Plains Studies.

Jasbir Singh received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Litao Yang received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Animal Science

Ellen G. Bergfeld received the John Hallman Memorial Award from the Department of Animal Science.

Christi M. Calhoun received the National Pork Fellowship from the National Pork Producers Council and the Outstanding Graduate Student Award from Tyson Foods.

Mary F. Forman received the Graduate Student Research Manuscript Award from the Poultry Science Association.

Brad A. Freking received the Vincent H. Arthaud Travel Award from the Department of Animal Science.

Lowell S. Gould was the recipient of the Frank Baker Essay Contest from the Beef Improvement Federation.

Jeffrey W. Koch received a Graduate Associateship from the Center for Biotechnology.

Gregory P. Lardy received the Vincent H. Arthaud Travel Award from the Department of Animal Science.

Humberto Madeira received the Milton E. Mohr Fellowship from the Center for Biotechnology; the Poster Competition award from the American Feed Ingredients Association; and third best poster presentation at Ethnic Minority Graduate Research Symposium from the Office of Graduate Studies, University of Nebraska.

Diane E. Moody received a Graduate Associateship from the Center for Biotechnology and the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Wesley N. Oshurn received first in paper competition from the Ak-Sar-Ben Chapter of the Institute of Food Technologists.

Bernadette M. O’Rourke received second in paper competition from the Ak-Sar-Ben Chapter of the Institute of Food Technologists.

Brian K. Quandt placed first in the M.S. degree Meat Science poster competition from the American Meat Science Association and received the Vincent H. Arthaud Travel Award from the Department of Animal Science.

Timothy D. Schnell received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Rebecca K. Splan received the Vincent H. Arthaud Travel Award from the Department of Animal Science.
Biological Systems Engineering

Sandra D. Bowling received the Milton E. Mohr Research Fellowship from the College of Engineering and Technology.

Anantha N.R. Kollengode received a $2,000 scholarship from the Society of Flavor Chemists.

Karen L. Lochte received the Milton E. Mohr Research Fellowship from the College of Engineering and Technology and the William and Eleanor Splinter Graduate Fellowship Award from the Department of Biological Systems Engineering.

Jose P. Molin received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division; the William and Eleanor Splinter Graduate Fellowship from the Department of Biological Systems Engineering; and the Young Scientist of the Year award in Brazil from the National Bureau of Research in Brazil.

David B. Parker received the outstanding graduate student award from the American Society of Agricultural Engineers, Mid-Central Conference.

Entomology

Thomas L. Clark received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Robert W. Davis received an outstanding student award and a research scholarship award from the National Urban Entomology Scholarship Conference.

J. Lester Figarola received first place in the Annual Entomological Society of America competition.

Paula Gouveia-Marcon received first place in the Sigma Xi student paper competition; received the Bukey Memorial Foundation from the Dean of Graduate Studies; and the Milton E. Mohr Biotechnology Fellowship Award from the Center for Biotechnology.

"I think the philosophy of research is transferred across the generations. You must constantly remind students that it's an adventure, it's a process of exploration and they need to use as much imagination as they possibly can."
Professor Dermot Coyne, Department of Horticulture

Fikru Haile received a fellowship from the University of Nebraska Foundation and a graduate associateship award from the Center for Biotechnology.

Doug Christensen received a Graduate Fellowship Award from the Institute of Food Technologists.

Forestry, Fisheries and Wildlife

Nancy A. Beecher received an Associate Membership Award from Sigma Xi, University of Nebraska Chapter.

Food Science and Technology

Theresa Boothe received a Graduate Fellowship Award from the Institute of Food Technologists.

"I think the philosophy of research is transferred across the generations. You must constantly remind students that it's an adventure, it's a process of exploration and they need to use as much imagination as they possibly can."
Professor Dermot Coyne, Department of Horticulture

Fikru Haile received a fellowship from the University of Nebraska Foundation and a graduate associateship award from the Center for Biotechnology.

Doug Christensen received a Graduate Fellowship Award from the Institute of Food Technologists.

Forestry, Fisheries and Wildlife

Nancy A. Beecher received an Associate Membership Award from Sigma Xi, University of Nebraska Chapter.

Horticulture

Daniel D. Beran received the Arthur William Sampson Fellowship Award in Pasture and Range Management from the Center for Grassland Studies.

Tiffany M. Heng-Moss received the Mary and Charles C. Cooper/Emma I. Sharpless Fellowship Award from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division.

Charles A. Rodgers received the Watson Fellowship Award from the Toro Company/Golf Course Superintendents Association of America.

Plant Pathology

Lisa M. Keith received the Best Poster Award from the American Pathological Society, North Central Division.

Alberto Marcon received the Outstanding Graduate Student Award from the Nebraska Chapter of Sigma Xi; the Milton E. Mohr Scholarship and Fellowship Fund from the Center for Biotechnology and the College of Engineering and Technology; and the Second Place Poster Presentation Award at the Ethnic Minority Graduate Research Symposium from the Office of Graduate Studies, University of Nebraska.
Veterinary and Biomedical Sciences

Nancy Caceres received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division and the Animal Health Research Award UNMC Student Research Forum, Inc., from the Pfizer Animal Health MVP Laboratories.

Susanne Eidmann received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Nagendra Hegde received the Susan A. Mills Memorial Graduate Student Award from the University of Nebraska Foundation.

Sridevi Gottipati received the Outstanding Graduate Student Presentation in Virology, American College of Veterinary Microbiologists, Conference of Research Workers in Animal Diseases from the American College of Microbiology and the UNMC Student Research Award, Animal Health Research Award: Research Most Beneficial to the Animal Health Industry from the MVP Laboratories.

Luis Sehang received the Best Graduate Student Seminar Presentation Award from the Department of Veterinary and Biomedical Sciences.

Nancy Witters received the Outstanding Graduate Student Presentation in Virology, American College of Veterinary Microbiologists, Conference of Research Workers in Animal Diseases from the American College of Microbiology and the UNMC Student Research Award, Animal Health Research Award: Research Most Beneficial to the Animal Health Industry from the MVP Laboratories.

Textiles, Clothing and Design

Marilyn Rasmussen received the Warren F. and Edith R. Day Student Aid Travel Award for Dissertation Research from the Office of the Dean of Graduate Studies, University of Nebraska.

Northeast Research and Extension Center

Thomas Hunt received the Milton E. Mohr Fellowship from the College of Agricultural Sciences and Natural Resources.

Thomas L. Clark received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Water Center/Environmental Programs

Robert W. Davis received an outstanding student award and a research scholarship award from the National Urban Entomology Scholarship Conference.
Ard faculty involved in plant breeding and genetics research make important contributions to the improvement and development of agricultural and horticultural crops.

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

Germplasm releases provide improved genetic material that is integrated into private and public plant breeding programs. Other releases occur as new cultivars (varieties), which are increased through the Foundation Seed Division and then provided to seed companies for production of certified seed. The following releases were made in 1996.

**Agronomy**

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

**Germplasm Release:** N801w

**Scientists:** B. Johnson, R. Preciado-Ortiz, and D. Hall

**Characteristics:** N801w originated from a population that was synthesized using progeny resulting from crosses between eight tropical populations and B513. N801w was developed by selfing within a selected full-sib family from the population. Although N801w contains 50% tropical germplasm, it is well adapted to the west-central and southwestern regions of the Cornbelt. N801w is a prolific pollen shedder and at Lincoln, NE requires approximately one additional day to begin pollen shed compared to B73. Synchronization between pollen shed and silk emergence is good, with silk emergence beginning approximately two days after pollen shed begins. N801w produces relatively short plants on sturdy stalks. Ears of the line per se are slightly tapered, and contain twelve rows of hard vitreous kernels with no dent. In hybrid combination with white inbred testers, N801w produces slightly dented kernels with small white caps above the harder more translucent white endosperm that predominates the kernel. Hybrid progeny of N801w have consistently exhibited good agronomic performance and grain quality, compared to commercial white hybrids of similar maturity. Hybrids produced using N801w are expected to be best adapted to southern and southeastern Nebraska, and east into the central Cornbelt. N801w has not been evaluated for resistance to specific pathogens or insects.

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

**Germplasm Release:** NP40

**Scientists:** P.T. Nordquist

**Characteristics:** This population serves as a source of greenbug biotype I and E resistance. The biotype I resistance was obtained from the Russian plant introductions, PI550607 and PI550610. The PI numbers were mated to male sterile plants (m5, m5 genetic male steriles) in an array of lines in the University of Nebraska sorghum breeding program at North Platte, NE. The crosses were advanced to the F3 generation prior to testing their reaction to biotype I greenbug. The biotype E resistant segregates have resistance levels approaching, but only in a few cases equal to, that of N85 and N90. The biotype I resistance levels approach that of PI550610. The recommendation would be to grow the germplasm in an environment where I and E greenbug are likely to occur. This would permit selection of tolerance to greenbug under both seedling and adult plant conditions. Several genotypes are still segregating for height. The population may have some remaining high tannin genotypes. The germplasm will segregate for m5, genetic male sterility. No test cross hybrids have been made with the
germplasm, however lines used in crosses had both B and R potential on A1 cytoplasm. The germplasm has not been screened for tolerance or susceptibility to any pathogens.

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

**Germplasm**

**Release:** 43 Grain Sorghum Genetic Stocks in A2, A3, and A4 Cytoplasm

**Scientists:** J.F. Pedersen, J.J. Toy, and B.E. Johnson

**Characteristics:** The 43 sorghum genetic stocks were developed by crossing the recurrent parent (elite grain sorghum parental lines) to the cytoplasm source followed by a minimum of 4 backcross generations in the field or greenhouse during the years 1987 to 1995. These genetic stocks closely resemble the recurrent parent and were completely male-sterile in Lincoln, NE and Mead, NE as determined by isolation in the field under pollinating bags during all backcross generations. These genetic stocks create a broad base of forage sorghum lines in A3 cytoplasm. They have immediate application for basic research involving forage sorghum with A3 cytoplasm, and immediate application as female lines for producing F1 hybrids, many of which will be heterotic combinations previously not possible on A1 cytoplasmic-male-sterility systems. Because of the low incidence of lines that restore fertility to A3 male-sterile plants, use of these lines directly or in hybrid combination will usually produce male-sterile plants. In agricultural use, such plants may reduce the threat of producing male fertile seed from outcrossing with weedy sorghum, and may have superior forage quality.

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"Plant breeders have to be futurists because it takes 8-10 years to develop a new variety."

Professor George Graef, Department of Agronomy

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

**Germplasm**

**Release:** 21 Grain Sorghum Genetic Stocks containing ms

**Scientists:** J.F. Pedersen, J.J. Toy, and B.E. Johnson

**Characteristics:** The 21 grain sorghum genetic stocks were developed by crossing the recurrent parent (elite grain sorghum parental lines) to the ms source followed by four backcross generations in the field at Lincoln, NE during the years 1987 to 1995. Selfing generations between each backcross were made in the greenhouse each winter. These genetic stocks closely resemble the recurrent parent and plants homozygous recessive for ms were completely male-sterile in Lincoln, NE and Mead, NE as determined by isolation in the field under pollinating bags following all selfing generations. These genetic stocks have A3 cytoplasm obtained from A3Tx398 or A3Tx430. These genetic stocks were developed by crossing the recurrent parent (elite forage lines) to the A3 source followed by a minimum of 4 backcross generations in the field or greenhouse during the years 1989 to 1995. These genetic stocks closely resemble the recurrent parent and were completely male-sterile in Lincoln, NE and Mead, NE as determined by isolation in the field under pollinating bags during all backcross generations.
Germplasm

Release: SGIP Population

Scientists: G.L. Graef and J.E. Specht

Characteristics: The SGIP population was developed to incorporate high seed protein content into an elite soybean population that was segregating for nuclear male sterility to facilitate intermitting. Eight plant introductions (PIs) were selected from the USDA Soybean Germplasm Collection based on their high seed protein concentration, which averaged 501 g/kg. The PIs that were used as male parents are PI 339734, PI 360843, PI 398516, PI 398672, PI 404177, PI 407788A, PI 423948A, and PI 423949. The cultivar ‘Hobbit 87’ was also used as a male parent because of its high yield and determinate growth habit. Three intermittings were used to form the cycle 0 population. The first intermitting consisted of hand pollinations between each of the male parents and male-sterile F2 plants of the SG lE3 population segregating for the ms 2 form of male sterility. The second intermitting involved a chain cross among the half-sib families from the first intermitting. The third intermitting was done in isolation in the field using a balanced composite of S 2 seeds and S 2 seeds from the second intermitting planted in alternating hill plots spaced 1.0 m apart. The SG1P population has been subjected to recurrent selection for increased seed protein. The base population is phenotypically diverse for seed yield and protein content, as well as other plant and seed traits. The pedigree diversity of the SG1E3 population and the different origins of the PI parents should also provide adequate genetic diversity for long-term improvement. Selfed seed from male-fertile plants of the third intermitting of cycle 0 were harvested in bulk and placed in cold storage (3M s 2 Ms 2 Ms 2 Ms 2 : 3Ms 2 Ms 2 Ms 2 Ms 2 ). For seed increase and rejuvenation, the bulk was planted in isolation for intermitting during the 1996 growing season. After harvest of male-sterile plants, selfed seeds from the remaining fertile plants were harvested in bulk. The harvested seed should provide a frequency of 4Ms 2 ms 2 : 1Ms 2 ms 2 .

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

Variety Name: Pronghorn


Released By: The University of Nebraska Agricultural Research Division, the United States Department of Agriculture, Agricultural Research Service, Northern Plains Region, the South Dakota State University Agricultural Experiment Station, and the University of Wyoming Agricultural Experiment Station.

Characteristics: ‘Pronghorn’ is an increase of a hard red winter wheat F3-derived line from the cross ‘Centura’/’Dawn’/’Colt’ sib. Pronghorn was released primarily for its superior adaptation to drought-prone, dryland agriculture and superior resistance to stem rust (caused by Puccinia graminis Pers. : Pers.) when compared to ‘Buckskin,’ the most popular wheat in Pronghorn’s area of adaptation. Pronghorn is an awned, winterhardy, medium early, white-chaffed, tall wheat cultivar that is 3 cm shorter than Buckskin, 2 cm taller than ‘Lamar,’ and 6 cm taller than ‘Arapahoe.’ It has a long coleoptile similar to ‘Scout 66’ and has moderate straw strength. Using western Nebraska data from the Nebraska Fall Sown Cereal Variety Trials (16 environments); data from the Western Regional Performance Nursery (17 environments); and Wyoming (11 environments); Pronghorn (2940 kg.ha-1) was 2% higher yielding than Lamar and 4% higher yielding than Arapahoe. Using data from only western
Nebraska and from Wyoming (27 environments), the yield of Pronghorn, Buckskin, Lamar, and Arapahoe were similar. In five years of testing in the advanced trials in Nebraska (24 environments), Pronghorn (3100 kg.ha⁻¹) was 4% lower yielding than ‘Alliance’; 2% lower yielding than ‘Redland,’ ‘Vista,’ and ‘Niobrara’; similar to ‘Rawhide’ and ‘Siouxland’; 4% higher yielding than Arapahoe; 7% higher yielding than ‘TAMI07,’ and 15% higher yielding than Buckskin. The recommended growing area for Pronghorn, based on current information, is the dryland wheat production areas of the Panhandle of Nebraska, eastern Wyoming, and western South Dakota. Pronghorn has exhibited moderate resistance to stem rust and is moderately susceptible to leaf rust. Pronghorn is susceptible to the Great Plains Biotype of Hessian fly, soilborne mosaic virus, and wheat streak mosaic virus. Pronghorn is a genetically high test weight wheat. The external appearance and internal attributes of the baked bread loaf indicated generally acceptable quality characteristics.

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**Plant Pathology**

**Crop:** Great Northern Bean [*Phaseolus vulgaris* (L.)]

**Germplasm**

**Release:** BELMINEB-RMR-3

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

**Released By:** United States Department of Agriculture, Michigan Agricultural Experiment Station, and the University of Nebraska Agricultural Research Division.

**Characteristics:** This is a rust and mosaic resistant, high yielding, upright short vine (type II, CIAT classification) white seeded, great northern dry bean germplasm line. This is the first released great northern bean to combine resistance to all 87 available races of the bean rust fungus, *Uromyces appendiculatus*, with resistance to all strains of bean common mosaic virus and bean common mosaic necrosis virus.
Patent protection is an important parameter in research. It is especially important for discoveries and innovations which have a potential commercial application. Therefore, from time to time, the ARD (and the University) may determine that the public good is best served with regard to technology transfer by entering into an agreement with a public or private institution which provides that institution with proprietary interests in specific research. The research of ARD scientists often can lead to a patent. Most of the patents that have been awarded to ARD scientists have been for equipment developments and specialized processes. These patents often are licensed by private industry, with royalties being reinvested in future ARD research. The following patents were awarded in 1996.

### Biological Systems Engineering

**Patent Title:** Biodegradable polymers  
**Patent Number:** 5,496,895  
**Scientists:** R. Chinnaswamy and M.A. Hanna  
**Description:** To prepare a biodegradable plastic, biodegradable materials such as starches and a non-biodegradable polymer such as a polystyrene, polyurethane, polyethylene, polypropylene, or polycarbonate are treated: (1) under heat, pressure and reagents to break the polymers; and (2) by adding to them an oxidizing agent. This treatment forms and/or makes available reactive groups for bonding: (1) on the biodegradable material groups such as aldehyde or hydroxyl groups in the case of the carbohydrates and amine groups in the case of proteins and certain other compounds such as urea; and (2) on the non-biodegradable plastic groups such as aldehydes, methyl, propyl, ethyl, benzyl, or hydroxyl groups.

### Plant Pathology

**Patent Title:** RNA transformation vector  
**Patent Number:** 5,500,360  
**Scientists:** P.G. Ahlquist and R.C. French  
**Description:** A method to use plus strand RNA viral transformation of host organisms with foreign RNA, and expression of said foreign RNA. The foreign RNA is inserted into an infective RNA viral segment containing replication elements, and allowed to infect the host organism. The invention is exemplified utilizing brome mosaic RNA modified to contain a gene coding for chloramphenicol acetyl transferase (CAT) in the transformation of barley protoplasts. This was the first use of an RNA virus to express foreign genes in any organism.

**Patent Title:** Novel promoters from Chlorella virus genes providing for expression of genes in prokaryotic and eukaryotic hosts  
**Patent Number:** 5,563,328  
**Scientists:** A. Mitra and J.L. Van Etten  
**Description:** Promoters are essential for expression of genes, and thus, are invaluable for biotechnology applications. Chlorella virus genomes were found to be a unique source of such promoters. Several promoters showed unusually strong and tissue specific expression characteristics.
Veterinary and Biomedical Sciences

**Patent Title:** Bovine cell line resistant to in vitro infection with bovine viral diarrhea virus and all other known pestiviruses

**Patent Number:** 5,541,102 (USA)

**Scientific:** R. O. Donis (virologist, University of Nebraska Agricultural Research Division)

**Description:** Bovine cell line resistant to infection by the pestiviruses Bovine Viral Diarrhea Virus (BVDV), Hog Cholera Virus (HCV) and Border Disease Virus (BDV), and all progeny and mutants thereof. A bovine cell line (CRIB) that is resistant to infection by cytopathic and non-cytopathic BVDV and by other pestiviruses due to a stable, recessive genetic defect which blocks infection at the level of viral entry.

**Patent Title:** Nucleotide sequences and method for detection of *Serpulina hyodysenteriae*

**Patent Number:** 2,125,120 (USA; Canada)

**Scientists:** G. E. Duhamel (bacteriologist, University of Nebraska Agricultural Research Division) and R. O. Elder (Ph.D. student, University of Nebraska Department of Veterinary and Biomedical Sciences)

**Description:** An expression plasmid library of *S. hyodysenteriae* genomic DNA, the etiologic agent of swine dysentery, was constructed in *Escherichia coli* and screened by colony immunoblot, using a mouse monoclonal antibody reacting with cell-free supernatant of *S. hyodysenteriae* containing hemolysin and cytotoxin activities. One immunopositive clone was identified and the DNA insert from that clone hybridized with HindIII digested genomic DNA of *S. hyodysenteriae* serotypes 1 through 7, but not with the intestinal spirochetes *S. innocens*, *S. pilosicoli*, and *Treponema succinifaciens* (Elder et al. 1993); Nucleotide Sequence and Methods for Detection of *S. hyodysenteriae* gene, a kanamycin resistance cassette was inserted into a unique *PstI* site of the gene in pUC18, and isogenic mutants of *S. hyodysenteriae* were generated by gene replacement. When examined in a murine model of swine dysentery, the mutants had significantly reduced virulence. Hence, the gene was designated virulence-associated gene A (virA) and the *S. hyodysenteriae* virA mutants with attenuated virulence phenotypes are submitted for consideration as potential live attenuated vaccines for prevention of swine dysentery.

**COPYRIGTHS**

Entomology

**Book Chapters for World Wide Web Sites**


**Refereed CD-ROM**

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 1996)

University of Nebraska
Board of Regents

Robert M. Allen, Hastings  
Don S. Blank, McCook  
Chuck Hassebrook, Walthill  
Drew Miller, Papillion

Nancy O’Brien, Waterloo  
John W. Payne, Kearney  
Rosemary Skrupa, Omaha  
Charles S. Wilson, Lincoln

Student Regents

UNMC — Sarah Svoboda  
UNO — Jason Winterboer  
UNL — Curtis Ruwe  
UNK — Bryan Reichmuth

Administrative Officers

L. Dennis Smith, President, University of Nebraska  
James C. Moeser, Chancellor, University of Nebraska-Lincoln  
Irvin T. Omtvedt, Vice Chancellor, Institute of Agriculture and Natural Resources and Vice President, University of Nebraska

Agricultural Research Division

Darrell W. Nelson, Dean and Director  
Dale H. Vanderholm, Associate Dean and Director  
Karen E. Craig, Assistant Director/Human Resources and Family Sciences  
Steven S. Waller, Assistant Dean and Director  
Kyle Hoagland¹, Administrative Intern  
Dora Dill, Administrative Technician  
Diane Mohrhoff, Project Assistant  
Nelvie Lienemann, Staff Secretary III  
Mary Jacobs¹, Temporary/On Call

¹Temporary appointment
Organizational Chart

Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln

Vice Chancellor
Irvin T. Omtvedt

Interim Associate Vice Chancellor
Darrell W. Nelson

Assistant Vice Chancellor
Finance and Personnel
Alan R. Moeller

Dean
Agricultural Research Division
Darrell W. Nelson* 

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

Dean
College of Human Resources and Family Sciences (IANR Research and Extension)
Karen E. Craig

Dean
Cooperative Extension Division
Kenneth R. Bolen**

Director
Conservation and Survey Division
Perry B. Wigley

Dean
International Programs
Glen Vollmar

*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 1997

### Agricultural/Natural Resources Departments

- **Agricultural Economics**
  - Gary Lynne, Head

- **Agricultural Leadership, Education and Communication**
  - Earl Russell, Head

- **Agricultural Meteorology**
  - Blaine Blad, Head

- **Agronomy**
  - Kenneth Cassman, Head

- **Animal Science**
  - Elton Aberle, Head

- **Biochemistry**
  - Marion O’Leary¹, Head
  - Robert Klucas², Interim Head

- **Biological Systems Engineering**
  - Glenn Hoffman, Head

- **Biometry**
  - David Marx¹, Head
  - Anne Parkhurst², Interim Head

- **Entomology**
  - Sharron Quisenberry, Head

- **Food Science and Technology**
  - Steve Taylor, Head

- **Forestry, Fisheries and Wildlife**
  - Gary Hergenrader, Head

- **Horticulture**
  - Paul Read, Head

- **Plant Pathology**
  - Anne Vidaver, Head

- **Veterinary and Biomedical Sciences**
  - Jack Schmitz, Head

### Human Resources and Family Sciences Departments

- **Family and Consumer Sciences**
  - Shirley Baugher, Chair

- **Nutritional Science and Dietetics**
  - Marilyn Schnepf, Chair

- **Textiles, Clothing and Design**
  - Rita Kean, Chair

### Off-Campus Research Centers

- **Agricultural Research and Development Center**
  - Ithaca—Daniel Duncan, Director

- **Northeast Research and Extension Center**
  - Concord—Robert Fritschen, Director

- **Panhandle Research and Extension Center**
  - Scottsbluff—Charles Hibberd, Director

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

- **Southeast Research and Extension Center**
  - Lincoln—Randy Cantrell, Director

- **West Central Research and Extension Center**
  - North Platte—Pete Jacoby, Director

### Interdisciplinary Centers

- **Biotechnology Center**
  - Don Weeks¹, Director
  - Anne Vidaver², Interim Director

- **Center for Grassland Studies**
  - Martin Massengale, Director

- **Center for Rural Community Revitalization and Development**
  - Sam Cordes, Director

- **Center for Sustainable Agricultural Systems**
  - Chuck Francis, Director

- **Food Processing Center**
  - Steve Taylor, Director

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

- **IANR Communications and Information Technology**
  - Dan Cotton, Director

- **Industrial Agricultural Products Center**
  - Milford Hanna, Director

- **Water Center/Environmental Programs**
  - Bob Volk, Director

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¹Ended appointment during 1996-1997
²Began appointment during 1996-1997
Research by Agricultural Research Division researchers is conducted across the state. Sites include:

Agricultural Research and Development Center — Ithaca
Dalbey-Halleck Farm — Virginia
Genoa Foundation Seed Farm — Genoa
Gudmundsen Sandhills Laboratory — Whitman
High Plains Agricultural Laboratory — Sidney
Horning Forestry Farm — Plattsmouth
Northeast Research and Extension Center — Concord
Panhandle Research and Extension Center — Scottsbluff
South Central Research and Extension Center, Great Plains Veterinary Educational Center, and the U.S. Meat Animal Research Center (USDA) — Clay Center
Southeast Research and Extension Center — Lincoln
West Central Research and Extension Center — North Platte
Approximately 334 faculty members have research appointments in ARD. Most have joint appointments, with teaching or extension responsibilities as well. Some faculty have responsibilities other than ARD research (rsch), extension (ext) or teaching (tch). Administrative appointments, as well as appointments with centers and other UNL units or with the USDA Agricultural Research Service (other), also are noted here.

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

UNL scientists also cooperate closely with many ARS faculty at the Roman L. Hruska Meat Animal Research Center (MARC) at Clay Center, Nebraska. There are about 50 scientists at the MARC facility, many of whom also hold UNL faculty status in the Department of Animal Science. MARC scientists are noted as USDA in the other category.

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

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

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

The percentages listed represent the proportion of a faculty member’s time assigned to each function. The primary research responsibility is identified for each. The rank listed is for July 1996-June 1997. All ARD off-campus personnel who are located at Centers are associated with an on-campus department as well [Department/(Area of Responsibility)].
### Agricultural/Natural Resources Departments

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#### Agricultural Economics

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#### Agricultural Leadership, Education and Communication

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### Human Resources and Family Sciences Departments

#### Family and Consumer Sciences

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2*Began research appointment during 1996-1997*
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**Nutritional Science and Dietetics**

**Textiles, Clothing and Design**

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**Off-Campus Research Centers**

**Northeast Research and Extension Center**

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¹Ended research appointment during 1996-1997
²Began research appointment during 1996-1997
### Interdisciplinary Activities

#### Water Center/Environmental Programs

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#### Agricultural Research Division

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<td>Assistant Dean and Director</td>
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</tbody>
</table>

1. Ended research appointment during 1996-1997
2. Began research appointment during 1996-1997
The Agricultural Research Division hosted 90 visiting scientists and research associates to the campus in 1996-1997. ARD research is complemented and enhanced by these collaborating scientists—it is through the sharing of knowledge and expertise that the field of science is advanced.

### Visiting Scientists

#### Agricultural Meteorology

<table>
<thead>
<tr>
<th>Visiting Scientist</th>
<th>Country</th>
<th>Expertise/Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marcelo B. Paes de Camargo</td>
<td>Brazil</td>
<td>Crop sensitivity to drought</td>
</tr>
<tr>
<td>Laxman S. Rathore</td>
<td>India</td>
<td>Medium range weather forecasting</td>
</tr>
</tbody>
</table>

#### Agronomy

<table>
<thead>
<tr>
<th>Visiting Scientist</th>
<th>Country</th>
<th>Expertise/Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michele Ariezo</td>
<td>Italy</td>
<td>Remediation of soil and water by advanced oxidation technologies</td>
</tr>
<tr>
<td>Roland Gerhards</td>
<td>Germany</td>
<td>Weed spatial distribution</td>
</tr>
<tr>
<td>Ruidong Huang</td>
<td>China</td>
<td>Sorghum mineral nutrition and environmental stress</td>
</tr>
<tr>
<td>Jan Rybczynski</td>
<td>Poland</td>
<td>Plant tissue culture/morphogenesis and development</td>
</tr>
<tr>
<td>Stefan Sahllstrom</td>
<td>Norway</td>
<td>Cereals and bread dough research</td>
</tr>
<tr>
<td>Derli Santana</td>
<td>Brazil</td>
<td>Soil science/GIS technology</td>
</tr>
</tbody>
</table>

#### Animal Science

<table>
<thead>
<tr>
<th>Visiting Scientist</th>
<th>Country</th>
<th>Expertise/Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Necmettin Ceylan</td>
<td>Turkey</td>
<td>Poultry nutrition</td>
</tr>
<tr>
<td>Denzel Crews</td>
<td>United States/Louisiana</td>
<td>Animal genetics</td>
</tr>
<tr>
<td>Joerg Dodenhoff</td>
<td>Germany</td>
<td>Animal genetics</td>
</tr>
<tr>
<td>William Fulton</td>
<td>United States/Nebraska</td>
<td>Ruminant nutrition</td>
</tr>
<tr>
<td>John Gaughan</td>
<td>Australia</td>
<td>Ruminant nutrition</td>
</tr>
<tr>
<td>Nicolas Gengler</td>
<td>Belgium</td>
<td>Animal genetics</td>
</tr>
<tr>
<td>Horacio Guitou</td>
<td>Argentina</td>
<td>Animal genetics</td>
</tr>
<tr>
<td>Shylaja Jagannatha</td>
<td>India</td>
<td>Animal genetics</td>
</tr>
<tr>
<td>Jette Jakobsen</td>
<td>Denmark</td>
<td>Animal genetics</td>
</tr>
<tr>
<td>Agnes Janosa</td>
<td>Hungary</td>
<td>Animal genetics</td>
</tr>
<tr>
<td>Emad Fahmy Ahmed Mousa</td>
<td>Egypt</td>
<td>Animal genetics</td>
</tr>
<tr>
<td>Fidel Pariacotte</td>
<td>Venezuela</td>
<td>Animal genetics</td>
</tr>
<tr>
<td>Visiting Scientist</td>
<td>Country</td>
<td>Expertise/Discipline</td>
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<tr>
<td>Paulo Rorato</td>
<td>Brazil</td>
<td>Animal genetics</td>
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<tr>
<td>Gary Snowder</td>
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</tr>
<tr>
<td>Akio Tamai</td>
<td>Japan</td>
<td>Livestock production</td>
</tr>
<tr>
<td>Jose Raul Valerio</td>
<td>Brazil</td>
<td>Host plant resistance of forages</td>
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<tr>
<td>Jones M. Mucke</td>
<td>Kenya</td>
<td>Insect plant interactions</td>
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<tr>
<td>Nazira Aytkhozhina</td>
<td>Kazakhstan</td>
<td>Fungal molecular biology</td>
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<tr>
<td>Shin-Churl Bae</td>
<td>Korea</td>
<td>Programmed cell death in plants</td>
</tr>
<tr>
<td>Elena Dagnino</td>
<td>Chile</td>
<td>Nematologist</td>
</tr>
<tr>
<td>Graciela Godoy-Lutz</td>
<td>Dominican Republic</td>
<td>Epidemiology bean pathogen variability, rhizoctonia</td>
</tr>
<tr>
<td>Isao Ishida</td>
<td>Japan</td>
<td>Plant and animal biotechnology</td>
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<tr>
<td>Jin-Ho Kang</td>
<td>Korea</td>
<td>Rice transformation</td>
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<tr>
<td>Fu Zhiming</td>
<td>China</td>
<td>Plant cell culture</td>
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<tr>
<td>Miguel Castillo</td>
<td>Venezuela</td>
<td>Cell biology and immunology</td>
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<tr>
<td>Seung-Ki Chon</td>
<td>Korea</td>
<td>Virology</td>
</tr>
<tr>
<td>Jose Maria Martinez</td>
<td>Spain</td>
<td>Pathology</td>
</tr>
<tr>
<td>Javier Masot</td>
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</tr>
<tr>
<td>Homayoung Shams</td>
<td>Denmark</td>
<td>Immunology</td>
</tr>
<tr>
<td>Jung Hyang Sur</td>
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<td>Pathology</td>
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**Entomology**

**Plant Pathology**

**Veterinary and Biomedical Sciences**

**Northeast Research and Extension Center**

**Research Associates**

**Agronomy**

<table>
<thead>
<tr>
<th>Research Associate</th>
<th>State/Country</th>
<th>Expertise/Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kessavalou Anabayan</td>
<td>Nebraska/USA</td>
<td>Soil science and agricultural sustainability</td>
</tr>
<tr>
<td>Jongil Chung</td>
<td>Nebraska/USA</td>
<td>PCR-based RAPD marker technology</td>
</tr>
<tr>
<td>Donna Delaney</td>
<td>Wisconsin/USA</td>
<td>Molecular genetics/gene mapping</td>
</tr>
<tr>
<td>Research Associate</td>
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<td>Expertise/Discipline</td>
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<tr>
<td>--------------------</td>
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<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Dennis Francis</td>
<td>Nebraska/USA</td>
<td>Soil and water science</td>
</tr>
<tr>
<td>Roel Funke</td>
<td>Netherlands</td>
<td>Plant molecular biology</td>
</tr>
<tr>
<td>Kathleen Heuss-Larosa</td>
<td>Nebraska/USA</td>
<td>Analysis of gene expression in transformed plants</td>
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<tr>
<td>Jose Moran</td>
<td>Spain</td>
<td>Biological nitrogen fixation</td>
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<tr>
<td>JaiHeon Lee</td>
<td>Nebraska/USA</td>
<td>Chromosome sorting</td>
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<tr>
<td>Raghavakaimal Padmakumar</td>
<td>India</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Zhengming Li</td>
<td>Nebraska/USA</td>
<td>Environmental remediation of organonitrogen contaminants in soil and water</td>
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<tr>
<td>Raunak Padmakumar</td>
<td>India</td>
<td>Chemistry</td>
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<tr>
<td>Woojoon Park</td>
<td>Nebraska/USA</td>
<td>Asian sheeted noodle products</td>
</tr>
<tr>
<td>Santhakumar Patil</td>
<td>Washington/USA</td>
<td>Plant molecular biology</td>
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<tr>
<td>Galina Vasilyeva</td>
<td>Pennsylvania/USA</td>
<td>Environmental remediation of organonitrogen contaminants in water and soil</td>
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<tr>
<td>Javier Seravalli</td>
<td>Kansas/USA</td>
<td>Protein sequencing</td>
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<tr>
<td>Charles Yamouah</td>
<td>Ghana</td>
<td>Modeling agronomic rotations project</td>
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<tr>
<td>Miheala Simianu</td>
<td>Wisconsin/USA</td>
<td>Bioanalytical chemistry</td>
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<tr>
<td>Zhanyuan Zhang</td>
<td>Nebraska/USA</td>
<td>Efficiency of soybean transformation</td>
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<tr>
<td>Lucy Smith</td>
<td>England</td>
<td>Plant biochemistry</td>
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<tr>
<td>Shinichi Taoka</td>
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<td>Enzyme mechanisms</td>
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<tr>
<td>Raul Arredondo-Peter</td>
<td>Mexico</td>
<td>Hemoglobins in higher plants</td>
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<tr>
<td>S. Todd Swanson</td>
<td>California/USA</td>
<td>Enzyme mechanisms</td>
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<tr>
<td>Tony Buhr</td>
<td>Nebraska/USA</td>
<td>Signaling in plant disease development</td>
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<tr>
<td>Sarbani Chakraborty</td>
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<tr>
<td>Matzu Furuta</td>
<td>Japan</td>
<td>Virologist</td>
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**Biochemistry**

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<thead>
<tr>
<th>Research Associate</th>
<th>State/Country</th>
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</thead>
<tbody>
<tr>
<td>Alexander Arendsen</td>
<td>Netherlands</td>
<td>Proteins/chemistry</td>
</tr>
<tr>
<td>Charles Yamouah</td>
<td>Ghana</td>
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<tr>
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<td>Bioanalytical chemistry</td>
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**Plant Pathology**

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<tbody>
<tr>
<td>Tony Buhr</td>
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</tbody>
</table>
Research Associate: Mike Graves
State/Country: Oregon/USA
Expertise/Discipline: Virologist

Research Associate: Dorit Landstein
State/Country: Israel
Expertise/Discipline: Virologist

Research Associate: Yu Li
State/Country: Nebraska/USA
Expertise/Discipline: Virologist

Research Associate: Santha Ramakrishnan
State/Country: Indiana/USA
Expertise/Discipline: Protein chemistry

Research Associate: Jeff Rollins
State/Country: Indiana/USA
Expertise/Discipline: Fungal molecular biology

Research Associate: Chidananda Sulli
State/Country: Idaho/USA
Expertise/Discipline: Plant gene regulation

Research Associate: Allen Szalanski
State/Country: Nebraska/USA
Expertise/Discipline: Nematology

Research Associate: Lingyu Zhang
State/Country: Nebraska/USA
Expertise/Discipline: Plant pathology

Research Associate: Ayub Ali
State/Country: Japan
Expertise/Discipline: Virology

Research Associate: Emil Berberov
State/Country: Bulgaria
Expertise/Discipline: Microbiology

Research Associate: Xiaoxing Cheng
State/Country: Switzerland
Expertise/Discipline: Microbiology

Research Associate: Sandra Fernandez
State/Country: Argentina
Expertise/Discipline: Microbiology

Research Associate: Ashfaque Hossain
State/Country: Glasgow/UK
Expertise/Discipline: Molecular virology/cell biology

Research Associate: Yunquan Jiang
State/Country: China
Expertise/Discipline: Biochemistry protein/purification and virology

Research Associate: Nelson Lezcano
State/Country: Argentina
Expertise/Discipline: Neurobiology

Research Associate: Anselmo Odeon
State/Country: California/USA
Expertise/Discipline: Viral pathogenesis

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State/Country: China
Expertise/Discipline: Cataract/eye disease

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State/Country: Russia
Expertise/Discipline: Molecular biology

Research Associate: Yange Zhange
State/Country: China
Expertise/Discipline: Molecular biology
Research Projects

Each faculty member with an ARD appointment has a federally-approved research project. A number of faculty have multiple projects. There are 445 research projects in agriculture, natural resources and family sciences. Projects are generally three to five years in duration. Faculty also are part of a national network of Agricultural Experiment Station scientists located at Land Grant Universities across the United States. ARD researchers currently are involved with about 55 regional projects in which they conduct cooperative research with scientists at other universities, addressing problems of regional and national importance. They also participate in approximately 65 regional research committees which serve to exchange information and coordinate cooperative research activities among institutions.

Research projects are listed by departments. An asterisk (*) indicates that the project was discontinued in fiscal year 1996-1997.

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Funding Source</th>
<th>Code</th>
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<tbody>
<tr>
<td>Hatch</td>
<td>Federal and State Funds</td>
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<tr>
<td>Regional Research</td>
<td>Federal Funds</td>
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<tr>
<td>State</td>
<td>State Funds</td>
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<tr>
<td>McIntire-Stennis</td>
<td>Federal Funds</td>
<td>ms</td>
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<tr>
<td>Special Grant</td>
<td>Federal, State, Public and Private</td>
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<tr>
<td>Competitive Grant</td>
<td>Federal Funds/USDA</td>
<td>cg</td>
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<tr>
<td>Animal Health</td>
<td>Federal Funds</td>
<td>ah</td>
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</table>

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

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

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

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

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

Competitive Grants: includes research in USDA national priority areas.

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

### Agricultural/Natural Resources Departments

#### Agricultural Economics

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<td>Factors affecting the evolution of world agricultural markets: implications for U.S. policy (E. W. F. Peterson)</td>
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| 18-001  | st | Dissemination of research information (T. Meisenbach) |
| 24-031  | st | Impacting agricultural literacy of elementary students and teachers through teacher workshops (O. S. Gilbertson) |
| 24-032  | st | The determinants and uses of leadership influence in agriculture (F. W. Brown) |

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| 27-004  | ha | Remotely sensed estimates of productivity, energy exchange processes and water stress in vegetation (B. L. Blad, E. A. Walter-Shea) |
| 27-007  | ha | Drought: response and policy implications (D. A. Wilhite) |
| 27-008  | rr | Climate and agricultural landscape productivity analysis and assessment in the North Central Region (K. G. Hubbard) |
| 27-009  | rr | Climate and agroecosystem modeling: developing information for decision making (A. Weiss) |
| 27-010  | rr | Environmental and genotypic control of assimilate allocation in grain crops (S. B. Verma, T. J. Arkebauer) |
| 27-011  | ha | Relationships between remotely-sensed spectral properties of vegetated surfaces and biophysical properties (E. A. Walter-Shea) |
| 27-012  | rr | NADP — A long-term monitoring program in support of research on the effects of atmospheric chemical deposition (S. B. Verma) |
| 27-014  | ha | The consequences of climate variation and change for agriculture and other natural resources (W. E. Easterling) |
| 27-015  | sg | Developing drought mitigation and preparedness technologies in the U.S. (D. A. Wilhite) |
| 27-016  | ha | Climate change and the winter wheat agroecosystem: experiments and modeling (A. Weiss) |
| 27-017  | ha | Remodeling the surface energy budget with a universal crop coefficient and natural variability specifications (K. G. Hubbard) |

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| 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 wheat, durums and triticales for Nebraska (P. S. Baenziger) |
| 12-072  | rr | Introduction, multiplication, evaluation, preservation, cataloguing and utilization of plant germplasm (D. Balthensperger, 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) |
| 12-173  | ha | Evaluating plant nutrient needs and product quality (K. D. Frank) |
| 12-174  | rr | Market quality of hard wheat for domestic and international foods (D. R. Shelton) |
| 12-181  | ha | Development of profitable reduced herbicide weed management systems through integration (A. R. Martin) |
| 12-187  | ha | Molecular characterization of genetic variation in soybeans (D. J. Lee) |
| 12-190  | ha | Leafy spurge: analysis of genetic variation by cpDNA characterization (D. J. Lee, M. L. Rowe) |
| 12-193  | ha | Investigating alternative grain and oil crops for Nebraska (L. A. Nelson) |
| 12-194  | ha | Novel methods for soybean genetic improvement and genomic analysis (J. E. Specht) |
| 12-195  | ha | Biometrical genetics, selection theory and methods and germplasm improvement in maize (B. E. Johnson) |
| 12-197  | ha | Tissue and cell physiology of sorghum (M. D. Clegg) |
| 12-198  | ha | Jasmonate regulated gene expression in soybean (P. E. Stanwick) |
| 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) |

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| 12-204  | rr | Biological and ecological basis for a weed management model to reduce herbicide use in corn (D. A. Mortensen, R. G. Wilson) |
| 12-207  | ha | Maize production practice influence on grain and stover yield and quality (S. C. Mason) |
| 12-209  | ha | Procedures for assessing impacts of nonpoint agrichemicals on ground water (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) |
| 12-215  | st | Development of integrated weed management strategies to improve Great Plains and midwest grasslands (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) |
| 12-220  | 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) |
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Ecological studies of Nebraska rangeland vegetation (J. H. Skopp)

Defining and assessing basic indicators of soil quality and erodibility (J. W. Doran, J. E. Gilley, J. R. Ellis, G. E. Varvel, J. F. Power)

Weed distribution and demography: elucidating pest management principles for reducing herbicide use (D. A. Mortensen)

Soil physical relationships for best management practices to protect water quality (W. L. Powers)


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13-128 ah Transfer of antibiotic resistance genes between bacteria and Prevotella species (M. Morrison)
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21-041  ha  Pathogenic determinants of phytopathogenic fungi (M. B. Dickman)
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 to control 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)
*21-051  eg  Enhanced nematode diagnostics by polymerase chain reaction (T. O. Powers)
21-053  ha  PCR based approaches for identification and epidemiology of parasitic nematodes (T.O. Powers)
21-054  sg  Genetic basis for pathogenicity in the genus Colletotrichum (M.B. Dickman)
*21-055  st  Avirulence gene D from Pseudomonas in a suicide gene (J. E. Partridge)
21-056  ha  Detection of seedborne bacteria and characterization of bacterial endophytes (A. K. Vidaver)
21-057  rr  Genetic variability in the cyst and root-knot nematodes (T.O. Powers)
21-058  rr  Overwinter survival of Heterodera, pratylenchus and associated nematodes in the North Central Region (T.O. Powers, E.D. Kerr)
21-059  eg  Gene flow in entomopathogenic nematodes (T.O. Powers)
21-060  eg  Irrigation effects on turfgrass disease biological control agents (G. Y. Yuen, C. L. Horst)
21-061  ha  Detection and properties of plant viruses of Nebraska with emphasis on sugar beet viruses (L. C. Lane)
21-062  eg  Pathogenecity and sclerotial development of Sclerotinia sclerotiorum: involvement of oxalic acid and chitin synthesis (M. B. Dickman)
21-063  ha  Biological control of soilborne diseases of legumes and turfgrass with antagonistic bacteria (G. Y. Yuen)
21-064  rr  Fusarium nyctinicos in cereal grains (M. B. Dickman)
21-065  sg  Biological control of Sclerotinia sclerotiorum on legumes in the North Central Region (G. Y. Yuen, D. L. Parke)
21-067  st  Molecular analysis of programmed cell death in plants (M. B. Dickman)
21-068  eg  Molecular mechanism of fumonisin induced pathogenesis in chicken (M. B. Dickman)

Veterinary and Biomedical Sciences

14-009  rr  Prevention and control of enteric diseases of swine (R. A. Moxley)
14-014  rr  Bovine respiratory disease (M. B. Rhodes)
14-039  st  Nebraska SPF swine laboratory (J. A. Schmitz, A. Hogg)
*14-055  ah  Pathogenesis of diseases due to bovine viral diarrhea virus infections in cattle (C. L. Kelling, R. O. Donis, G. E. Duhamel, M. B. Rhodes, S. Srikumaran)
*14-058  ah  Molecular characterization of bovine viral 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. GroteLuechehen)
14-066  ha  Functional analysis of the BHV-1 latency related gene (C. J. Jones)
*14-067  st  Evaluation and modulation of bovine immune function (L. J. Perino)
*14-074  eg  Molecular cloning and characterization of the cellular receptor for bovine herpesvirus 1 (S. Srikumaran, C. J. Jones, S. R. Thaker)
*14-076  ah  Molecular analysis of the bovine immune system: dissecting mammary gland T cell repertoire (S. A. Chen)
14-077  ah  Molecular genetics analysis of Mycobacterium paratuberculosis and related mycobacterial pathogens (R. G. Barletta)
14-078  ah  Role of group A bovine rotavirus P protein antigenic epitopes in immunity and infection (G. E. Duhamel)
*14-079  st  Synergism between bacteria spp. and Serpula hylodes teria in swine dysentery (G. E. Duhamel, M. Morrison, R. A. Moxley)
*14-080  st  How does the fungal toxin, fumonisin, induce carcinogenesis (C. J. Jones, M. B. Dickman)
14-081  eg  Analysis of the bovine herpesvirus 1 latency related gene (C. J. Jones)
14-082  eg  Cellular molecules mediating bovine viral diarrhea virus infection (R. O. Donis)
14-085  rr  Research in support of a national eradication program for pseudorabies (F. A. Osoiro)
14-086  eg  Molecular characterization of Pasteurella haemolytica leukotoxin-receptor-interactions (S. Srikumaran)
14-087  eg  Identification of Mycobacterium paratuberculosis virulence determinants (R. G. Barletta)
14-088  eg  Analysis of BHV-1 gene expression during reactivation from latency (C. J. Jones)
11-089  cg  Role of group A bovine P protein in induction of heterotypic immunity (G. E. Duhamel)

11-090  st  Development of a mycobacterial marker vaccine (R. Barletta, R. Morley)

11-091  cg  Molecular characterization of MHC class I down-regulation by bovine herpesvirus I (S. Srikumaran)

11-092  cg  The biology of persistent infections caused by porcine reproductive and respiratory virus (F. A. Osorio, A. R. Doster)

14-019  sg  Bovine respiratory syncytial virus glycoprotein interactions in a homologous host cell receptor (C. Belling)

14-021  st  The impact of welfare reform on women’s lives: education, job placement/retention and resource management (K. Prochaska-Cue, B. Sparks)

**Nutritional Science and Dietetics**

- 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)

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

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

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

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

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

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

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

**Textiles, Clothing and Design**

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

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

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

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

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

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**Human Resources and Family Sciences Departments**

**Family and Consumer Sciences**

- 92-018  ha  The infant as a group participant (J. Kaurz)

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

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

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

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

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

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**Off-Campus Research Centers**

**Northeast Research and Extension Center**

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

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

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**Panhandle Research and Extension Center**

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

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

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

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

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

- 44-044  ha  Sugarbeet planters — plant spacing and emergence performance (J. A. Smith, C. D. Yonts, N. M. Lewis)
44-045 ha
Resource efficient dryland cropping systems for western Nebraska
(D. J. Lyon)

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

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

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

44-049 st
New seeded preparation technology for improved sugarbeet emergence
(J. A. Smith, R. C. Wilson)

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

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

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

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

South Central Research and Extension Center

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

48-019 ha
Managing weeds and herbicides for profitable crop production and reduced environmental impacts (F. W. Roeth)

48-020 ha
Nitrogen management factors influencing utilization efficiency and loss processes to the environment (R. B. Ferguson)

48-021 sg
Factors influencing spatial yield and N use efficiency of furrow-irrigated corn (R. B. Ferguson, G. W. Herget, C. A. Guttway)

48-022 ha
Crop insect pest management in Nebraska: biological control and sampling (R. J. Wright)

48-023 ha
Formulation of nitrogen fertilization recommendations to maximize economic and environmental goals (R. A. Selley)

West Central Research and Extension Center

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

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

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

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

43-052 ha
Quantifying year-round 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 (C. A. Wicks)

43-056 ha
Interception of trace minerals as related to prenatal supplementation of the pregnant beef cow (J. L. Johnson)

43-057 ha
Improving the profitability and sustainability of Sandhills beef cattle operations (R. T. Clark)

43-058 ha
Biology, ecology, economics and control of major insects affecting cattle in Nebraska (J. B. Campbell)

43-059 ha
Production systems and nutrition for Sandhills and Northern Great Plains range (D. C. Adams)

Interdisciplinary Activities

Administration

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

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

Agricultural Research and Development Center

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

Center for Grassland Studies

33-001 st
Center for Grassland Studies (M. A. Massengale)

Center for Sustainable Agriculture Systems

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

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

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

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

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)

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

19-005 sg
Development and quality/safety enhancement of specialty food products (S. L. Taylor)

19-006 sg
Alliance for food protection (S. L. Taylor)

Industrial Agricultural Products Center

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

29-004 sg
Industrial agricultural products center (M. A. Hanna)

29-005 cg
Nonedible wheat gluten films for use as mulch and bags (W. M. Ghorpade, C. L. Weller)

29-006 st
Production of microcrystalline cellulose from soybean hulls and corn cobs (V. Miladinov, A. Gennadios, M. A. Hanna)

Water Center/Environmental Programs

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

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

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

30-003 sg
Management of irrigated corn and soybeans to minimize ground water contamination (D. G. Watts)
While serving the needs of Nebraska’s agricultural producers, agribusinesses, industries, communities and citizens, the ARD places a high priority on being accountable for its resources and documenting impacts of its programs. As in all research institutions, ARD scientists are charged to actively disseminate results of research in scientific journals and technical publications. The division sets optimistic, but reachable, annual goals for scientific publication, theses and dissertations, and other measures of research output. In each of the last two years the goals have been exceeded.

Publications in refereed (peer reviewed) scientific journals represent professional acknowledgment of the value of a research finding to the discipline. ARD scientists have published in a number of different scientific journals during 1996. Faculty also have written books, edited books or contributed chapters for books.

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

Publications in refereed journals, books, book chapters, theses and dissertations are listed for calendar year 1996.

### Journals in which faculty have published in 1996

#### Agricultural/Natural Resources Departments

##### Agricultural Economics

- American Journal of Agricultural Economics
- Applied Economic Letters
- Applied Economics
- Journal of Agricultural and Resource Economics
- Rangelands
- Review of Agricultural Economics

##### Agricultural Meteorology

- Agricultural and Forest Meteorology
- Agronomy Journal
- Boundary-Layer Meteorology
- Climate Change
- Climate Research
- Journal of Geophysical Research
- Journal of Production Agriculture
- Natural Hazards
- Weed Science

##### Agronomy

- African Crop Science Journal
- Agrochimica
- Agronomy Journal
- Cereal Chemistry
- Crop Science
- Environmental Pollution
- Genetics
- Genome
- Journal of the American Society of Horticultural Science
- Journal of Applied Ecology
- Journal of Environmental Quality
- Journal of Plant Physiology
- Journal of Range Management
- Journal of Soil and Water Conservation
- Journal of Sugar Beet Research
- Maydica
- Phytopathology
- Plant Genetic Research Newsletter
- Plant Physiology
- The Prairie Naturalist
- Restoration and Management
- Theoretical and Applied Genetics
- Transactions of the American Society of Agricultural Engineers
- Water Resources Bulletin
- Weed Science
- Weed Technology
Animal Science
Animal Feed Science and Technology
Animal Reproduction Science
Applied and Environmental Microbiology
Australian Journal of Agricultural Research
Biology of Reproduction
Brazilian Journal of Genetics
Crop Science
Journal of Animal Science
Journal of Bacteriology
Journal of Capillary Electrophoresis
Journal of Dairy Science
Journal of Food Processing and Preservation
Journal of Food Quality
Journal of Foodservice Systems
Journal of Food Science
Journal of Muscle Foods
Meat Science
Nutrition Research
Poultry Science
Professional Animal Scientist
Rangelands

Biochemistry
Annual Review Plant Physiology Plant Molecular Biology
Planta
Plant Physiology
Proceedings of the National Academy of Sciences

Biological Systems Engineering
AgroForestry Systems
Agronomy Journal
Applied Engineering in Agriculture
Cereal Chemistry
Food Processing and Preparation
Industrial Crops and Products
Journal of Agricultural Engineering Research
Journal of American Oil Chemists Society
Journal of Animal Science
Journal of Environmental Engineering
Journal of Food Production
Journal of Food Science
Starke
Transactions of the American Society of Agricultural Engineers
Water Resources Research

Biometry
ACS Symposium Series 630—American Chemical Society
African Crop Science Journal
Applied Engineering in Agriculture
Journal of Agricultural, Biological and Environmental Statistics
Journal of Heredity
Journal of Phytopathology
Journal of Range Management
Phytopathology
Plant Disease
Poultry Science
Weed Science

Entomology
Agronomy Journal
Annals Entomological Society of America
Archives of Insect Biochemistry and Physiology
Biological Control
Biochemical Genetics
Bulletin of Environmental Contamination and Toxicology
Comparative Biochemistry and Physiology
Environmental Entomology
Environmental Pollution
Insect Biochemistry and Molecular Biology
Journal of Agricultural, Biological and Environmental Statistics
Journal of Agricultural Entomology
Journal of Economic Entomology
Journal of Insect Physiology
Journal of Medical Entomology
Medical and Veterinary Entomology
Weed Science

Food Science and Technology
Bulletin of Environmental Contamination and Toxicology
Cereal Chemistry
Current Microbiology
Food Microbiology
Food Processing and Preparation
HortTechnology
Industrial Crops and Products
Journal of Agriculture and Food Chemistry
Journal of American Oil Chemists Society
Journal of Capillary Electrophoresis
Journal of Fermentation and Bioengineering
Journal of Food Production
Journal of Food Protection
Journal of Food Science
New England Journal of Medicine
Poultry Science
Starke
Transactions of the American Society of Agricultural Engineers

Forestry, Fisheries and Wildlife
Agronomy Journal
American Midland Naturalist
Bulletin of Environmental Contamination and Toxicology
Climate Research
Environmental Entomology
HortTechnology
Wetlands

Horticulture
Agricultural and Forestry Meteorology
Crop Science
Environmental Pollution
First International Workshop on Common Bacterial Blight of Beans
Horticultural Series
HortTechnology
Journal of the American Society of Horticultural Science
Journal of Heredity
Journal of Turfgrass Management
Plant Disease
Weed Technology

Plant Pathology
Agricultural and Forest Meteorology
Annals Entomological Society of America
Applied and Environmental Microbiology
Archives of Virology
Crop Science
First International Workshop on Common Bacterial Blight of Beans
Integrated Pest Management Reviews
Journal of the American Society of Horticultural Science
Journal of Kansas Entomology Society
Journal of Phytopathology
Journal of Plant Biochemistry and Biotechnology
Molecular and General Genetics
Molecular Plant-Microbe Interactions
Nucleic Acids Research
The Nucleus
Phytopathology
Plant Disease
Proceedings of the National Academy of Science
Virology

Veterinary and Biomedical Sciences
American Journal of Veterinary Research
Comparative Immunology and Microbiology of Infectious Disease
Immunology and Microbiology of Infectious Disease
Journal of Clinical Microbiology
Journal of Food Production
Journal of General Virology
Journal of Veterinary Diagnostic Investigation
Journal of Virology
Microbial Pathogenesis
Proceedings of the National Academy of Science
Veterinary Pathology

Human Resources and Family Sciences Departments

Family and Consumer Sciences
Eta Sigma Gamma Monograph Series
International Journal of Sociology of the Family
Journal of Adolescents
Journal of Consumer Education
Journal of Marital and Family Therapy
North Dakota Journal of Human Services
Psychological Reports
Supervision Bulletin

Nutritional Science and Dietetics
International Journal of Vitamin and Nutrition Research
Journal of Food Quality
Journal of Foodservice Systems
Journal of Muscle Foods
Nutrition Research

Textiles, Clothing and Design
Clothing and Textiles Research Journal
Insect Pests in the Urban Environment
International Journal of Research on Aging and Human Development
The International Review of Retail Distribution and Consumer Research
Journal of the Community Development Society
Journal of Family and Consumer Sciences
Journal of Hazardous Waste and Hazardous Materials
Journal of Small Business Management
Textiles Chemist and Colorist
Off-Campus Research Centers

Northeast Research and Extension Center
- Applied Engineering in Agriculture
- Environmental Entomology
- Journal of Animal Science
- Journal of Economic Entomology

Panhandle Research and Extension Center
- Agri-Practice
- American Potato Journal
- The Bovine Practitioner
- Crop Science
- First International Workshop on Common Bacterial Blight of Beans
- Journal of Environmental Quality
- Journal of Production Agriculture
- Journal of Range Management
- Journal of Sugar Beet Research
- Phytopathology
- Plant Disease
- Transactions of the American Society of Agricultural Engineers
- Weed Science
- Weed Technology

South Central Research and Extension Center
- Weed Science
- Weed Technology

West Central Research and Extension Center
- Applied Engineering in Agriculture
- Compendium for Practicing Veterinarians
- Horticultural Science
- Journal of Animal Science
- Journal of Economic Entomology
- Journal of Plant Nutrition
- Journal of Production Agriculture
- Journal of Range Management
- Journal of Soil and Water Conservation
- Rangelands
- Weed Science

On-Campus Research Center

Water Center/Environmental Programs
- Archives of Insect Biochemistry and Physiology
- Environmental Entomology
- Water Resources Bulletin

Research Publications (1996)

Agricultural/Natural Resources Departments

Agricultural Economics

Journal Articles
- Matching the cow with forage resources. Rangelands 18:57-62. (J. Series No. 11265)

- Testing the monopsony inefficiency incentive for backward integration. American Journal of Agricultural Economics 78:585-590. (J. Series No. 9801)

Alamos, A.M. 1996b.
- Estimating the degree of dominance in a bilateral oligopoly. Applied Economic Letters 3:209-211. (J. Series No. 10253)

- Is there more than one critical concentration ratio? Applied Economics 28:649-670. (J. Series No. 11019)

- Using cluster analysis to classify farms for conventional/alternative systems. Review of Agricultural Economics 18:599-611. (J. Series No. 11267)

- Measuring productivity with poorly-priced goods. American Journal of Agricultural Economics 78:620-628. (J. Series No. 11862)


Ph.D. Dissertations
Alamos, A.M. 1996.
- Demand-supply dynamics and input price shocks: a case study of the U.S. livestock industry. (G.A. Helmers, Advisor)

Agricultural Meteorology

Journal Articles

- Seed longevity of 41 weed species buried 17 years in eastern and western Nebraska. Weed Science 44:74-86. (J. Series No. 7600)

- Adapting North American agriculture to climate change. Agricultural and Forest Meteorology 80:xix-xi. (J. Series No. 11367)

Research Bulletins

Book Chapters
(J. Series No. 11368)

(J. Series No. 11339)

(J. Series No. 11119)

M.S. Theses

Energy fluxes in a mid-latitude prairie wetland ecosystem. (S.B. Verma, Advisor)

Idso, C.D. 1996.
A semi-empirical approach to quantifying temperature trends at 193 locations in the conterminous USA from 1961-1990. (K.G. Hubbard, Advisor)

Ph.D. Dissertations

Mielnic, P.C. 1996.
Soil carbon dioxide flux in agricultural ecosystems. (S.B. Verma, Advisor)

Xu, M. 1996.
Wheat grain quality as related to climate: evaluation and model development. (K.G. Hubbard, Advisor)

Agronomy

Journal Articles

Phosphorus nutrition and water stress effects on proline accumulation in sorghum and bean. Journal of Plant Physiology 148:745-753.
(J. Series No. 10889)

Competition between triazine-resistant and -susceptible common waterhemp (Amaranthus rudis) in field corn (Zea mays). Weed Technology 10:570-375.
(J. Series No. 11264)

Occurrence and control of triazine-resistant common waterhemp (Amaranthus rudis) in field corn (Zea mays). Weed Technology 10:570-375.
(J. Series No. 11304)

Andrews, D.J. and K.A. Kumar. 1996.
(J. Series No. 11126)

(J. Series No. 11156)

(J. Series No. 11718)

(J. Series No. 11038)

(J. Series No. 10887)

(J. Series No. 11495)

(J. Series No. 10587)

(J. Series No. 11347)

Association of plant p40 protein with ribosomes is enhanced when polyribosomes form during periods of active tissue growth. Plant Physiology 111:559-568.
(J. Series No. 11325)

Influence of seeding and N rates on grain characteristics of winter barley under semi-arid conditions. Agrochimica 40:114-122.
(J. Series No. 9992)

(J. Series No. 11031)

(J. Series No. 11149)

(J. Series No. 10941)

Chloroplast DNA and Nuclear DNA content variation among cultivars of switchgrass, Panicum virgatum L. Crop Science 36:1049-1052.
(J. Series No. 11278)

(J. Series No. 11238)

Parametric sequential sampling based on multistage estimation of the negative binomial parameter k. Weed Science 44:555-559.
(J. Series No. 11029)


Books


Book Chapters


M.S. Theses


Aziz, A.H. 1996. Evaluation of nitrate and chloride leaching, residual soil nitrate distribution and nitrogen uptake under no-till irrigated continuous corn and corn soybean rotation. (G.W. Hergert, Advisor)

Chen, Y. 1996. Precision placement of nitrogen fertilizer in irrigated corn. (J.S. Schepers, Advisor)

Garst, J.L. 1996. Heritability of and interrelationships among traits of two edamame soybean populations. (G.L. Graef, Advisor)


Hayward-Jones, J.M. 1996. Growth characteristics of a cornbelt x highland Peruvian maize population with respect to cold tolerance. (B.E. Johnson, Advisor)


Rathjen, M.E. 1996. Postemergence weed control in corn (Zea mays) and soybeans (Glycine max) utilizing reduced herbicide rates. (A.R. Martin, Advisor)


Vanyarkho, O.V. 1996. Seasonal changes in vegetative characteristics and gas exchange properties of Phragmites australis and Scirpus acutus in mid-latitude prairie wetland ecosystem. (T.J. Arkebauer, Advisor)


Ph.D. Dissertations


Chang, J. 1996. Genetic variance components and quantitative trait loci mapping for soybean (Glycine max L.) seed size. (J.E. Specht, Advisor)


Ma, L. 1996. Impact of artificial ground water recharge at two Nebraska sites. (R.F. Spalding, Advisor)


Teo-Sherrill, C.P. 1996. The fates of weed seeds. (D.A. Mortensen, Advisor)

Todd, R.W. 1996. Latent heat fluxes of a soybean field measured and modeled by energy balance - combination models. (T.J. Arkebauer and N.L. Klocke, Advisors)


Animal Science

Journal Articles


Baggio, L. and M. Morrison. 1996. The NADPH-utilizing glutamate dehydrogenase of Bacteroides thetaiotaomicron belongs to enzyme family I, and its activity is affected by trans-acting gene(s) positioned downstream of gbdA. Journal of Bacteriology 178:7212-7220. (J. Series No. 11499)


Scheideler, S.E. and G.W. Froning. 1996. The combined influence of dietary flaxseed variety, level, form, and storage conditions on egg production and composition among vitamin E-supplemented hens. Poultry Science 75:1221-1226. (J. Series No. 11256)


Wen, Z. and M. Morrison. 1996. The NAD(P)H-dependent glutamate dehydrogenase activities of Prevotella ruminicola B.4 can be attributed to one enzyme (GdhA), and GdhA expression is regulated in response to the nitrogen source available for growth. Applied and Environmental Microbiology 62:3826-3833. (J. Series No. 11392)


Book Chapters


Cappel, T.G. 1996. An evaluation of dystocia and the endocrine response to stress in the primiparous heifer and calf. (E.T. Clemens, Advisor)

Cappel, T.G. 1996. An evaluation of dystocia and the endocrine response to stress in the primiparous heifer and calf. (E.T. Clemens, Advisor)


M.S. Theses

Adams, V. 1996. Genetic analysis of weaning to service, weaning to conception and weaning to farrowing intervals in sows. (R.K. Johnson, Advisor)

Cappel, T.G. 1996. An evaluation of dystocia and the endocrine response to stress in the primiparous heifer and calf. (E.T. Clemens, Advisor)


Frank, J.A. 1996. Bioassay for growth hormone releasing hormone (GHRH) utilizing a cAMP-responsive alkaline phosphatase reporter system and a recombinant GHRH receptor. (H.E. Grotjan, Advisor)


Jaroni, D. 1996. The effect of dietary wheat midds and enzyme supplementation on late egg production efficiency, egg yields and composition. (S.E. Scheideler, Advisor)

Melvin, E.J. 1996. Endocrine changes during waves of ovarian follicular development in prepubertal heifers. (J.E. Kinder, Advisor)
Ph.D. Dissertations

Abel-Caines, S.F. 1996. Nonenzymatically browning soybeans and soybean coproducts for lactating dairy cows. (R.J. Grant, Advisor)

Bergfeld, E.G. 1996. LHHR modulation of pituitary function and LH modulation of ovarian follicular growth during sexual maturation in beef cattle. (J.E. Kinder, Advisor)

Ferreira, G.R. 1996. Genetic parameters for preweaning and growth traits estimated using different statistical models. (L.D. Van Vleck, Advisor)

Gould, L.S. 1996. Simulation of a beef cattle herd to examine different selection strategies. (L.D. Van Vleck, Advisor)


Jagannatha, S. 1996. Estimation of relative economic values for production and non-production traits from field data using profit functions. (J.F. Keown, Advisor)

Journal Articles


Li B., X. Q. Zhang, and R. Chollet. 1996. Phosphoglycerate carboxylase kinase in tobacco leaves is activated by light in a similar but not identical way as in maize. Plant Physiology 111:875-885. (J. Series No. 11373)


M.S. Thesis


Ph.D. Dissertation

Hong, Soekjoo 1996. Nuclear mutations affect the catalysis, stability and expression of chloroplast ribulose-1,5-bisphosphate carboxylase/oxygenase in Chlamydomonas reinhardtii (R. J. Spreitzer, Advisor)

Biology

Journal Articles


**Book Chapters**


**M.S. Theses**


Ph.D. Dissertations


Biometry

Journal Articles


Book

Stanley-Samuelson, D.W. 1996. Writing from the winner’s circle: A guide to writing competitive grant proposals. p. 48. Nebraska EPSCoR, University of Nebraska, Lincoln, NE.

M.S. Theses

Figarola, J.L. 1996. Enzyme-linked immunosorbent assay (ELISA) to distinguish the primary screwworm, Cochliomyia hominivorax (Coquerel) from the secondary screwworm, C. macellaria (Fabricius) (Diptera: Calliphoridae) and other myiasigenous flies. (S.R. Skoda and G.D. Thomas, Advisors)

Haile, F.J. 1996. Response of soybean varieties to insect defoliation. (L.G. Higley, Advisor)

Ph. D. Dissertations

Davis, R.W. 1996. Effect of rodding tips and soil types on distribution of selected insecticides and a water soluble dye when applied for subterranean termite control. (S.T. Kamble, Advisor)


Seymour, R.G. 1996. Prediction of European corn borer (Leioidoptera: Pyralidae) egg and neonate larval survival and microclimate in field corn as affected by irrigation in west central Nebraska. (J.B. Campbell and R.J. Wright, Advisors)


Food Science and Technology

Journal Articles


Textural, color, sensory properties of bologna containing various levels of washed chicken skin. Poultry Science 75:1047-1055. (J. Series No. 11333)


Phosphate and modified connective tissue effects on reduced fat, high water-added frankfurters. Journal of Food Science 61:1-7. (J. Series No. 10992)


Mechanical and barrier properties of egg albumen films. Journal of Food Science 61:393-399. (J. Series No. 11285)

Stability of uric acid used as an indicator of insect contamination during extrusion of wheat flour. Cereal Chemistry 73:625-627. (J. Series No. 11375)

Distribution of uric acid in the fractions obtained from experimental milling of wheat infected with granary weevil larvae. Cereal Chemistry 73:628-631. (J. Series No. 11357)

Mechanical properties of soy protein-polyethylene ribbon and film extrudates. Transactions of the American Society of Agricultural Engineers 39:611-615. (J. Series No. 11043)

Cloning and expression of the Zymomonas mobilis production of ethanol genes in Lactobacillus casei. Current Microbiology 33:250-260. (J. Series No. 11450)

Crystallization characteristics of methyl tallowate and its blend with ethanol and diesel fuel. Journal of American Oil Chemists Society 73:759-763. (J. Series No. 11315)

Restructuring of pork meat in a twin-screw extruder. Food Processing and Preparation 20:391-402. (J. Series No. 11351)


Physical and molecular properties of re-extruded starches as affected by extruder screw configuration. Journal of Food Science 61:1-5. (J. Series No. 11201)

Cohab 60 radiation effects on co-polymers of starch and plastics. Cereal Chemistry 73:539-542. (J. Series No. 11406)

Volatiles retention as influenced by method of addition during extrusion cooking. Journal of Food Science 61:985-989,1079. (J. Series No. 11359)

Cohab 60 radiation effects on co-polymers of starch and plastics. Cereal Chemistry 73:539-542. (J. Series No. 11406)

Volatiles retention as influenced by method of addition during extrusion cooking. Journal of Food Science 61:985-989,1079. (J. Series No. 11359)

Miladinov, V. and M.A. Hanna. 1996.
Apparent viscosity of co-extruded starch and xanthan gum. Industrial Crops and Products 5:183-189. (J. Series No. 11401)

Molds and mycotoxins in foods from Burundi. Journal of Food Protection 59:369-875. (J. Series No. 11297)

Lipase production by lactic acid bacteria and activity on butter oil. Food Microbiology 133:383-389. (J. Series No. 11451)


Structural and chemical properties of native corn starch granules. Starske 48:249-255. (J. Series No. 10669)

Effect of corn wet-milling conditions (sulfur dioxide, lactic acid, and steeping temperatures) on starch functionality. Cereal Chemistry 73:632-637. (J. Series No. 11340)

Scheideler, S.E. and G.W. Froning. 1996.
The combined influence of dietary flaxseed variety, level, form, and storage conditions on egg production and composition among vitamin E-supplemented hens. Poultry Science 75:1223-1226. (J. Series No. 11256)

Subramanian, K. and M.A. Hanna. 1996.
Glycol glucosides synthesis by reactive extrusion with a static mixer as a post-extruder reactor. Cereal Chemistry 73:179-184. (J. Series No. 11090)

Inhibition of Salmonella typhimurium on agar and poultry skin by ultraviolet energy. Journal of Food Protection 59:319-321. (J. Series No. 10493)


Comparison of thin-layer chromatography and an enzyme-linked immnosorbant assay for detection and quantification of deoxynivalenol in corn and wheat. Journal of Food Protection 59:439-440. (J. Series No. 11185)


Yellow nutseed (Cyperus esculentus L.) tuber oil as a fuel. Industrial Crops and Products 5:177-181. (J. Series No. 11398)

Book Chapters

Bullerman, L.B. 1996.


M.S. Theses


M.S. Theses


Ph.D. Dissertations

Chiruvolu, V.R. 1996. Fermentation studies of recombinant yeast. (M.M. Meagher, Advisor)

Miau, J.-P. 1996. Functional properties of corn starch polymers based on their molecular weight and structural characteristics. (D.S. Jackson, Advisor)

Zirnstein, G.W. 1996. The galM (mutarotase) gene of S. thermophilus F410: partial sequencing, transcriptional analysis, relationship to downstream genes, and possible roles in explaining the galactose phenotypes of S. thermophilus strains. (R.W. Hutkins, Advisor)

Forestry, Fisheries and Wildlife

Journal Articles


Book Chapter


M.S. Theses


Nelson, K.J. 1996. Chronic effects of baseflow levels of atrazine on Platte River algae. (K.D. Hoagland, Advisor)


Ph.D. Dissertations

Messad, I.A. 1996. Histomorphological responses of red shiner (Cyprinella lutrensis) to atrazine, terbutol, and their mixture. (E.J. Peters and K.D. Hoagland, Advisors)

Yu, S. 1996. Factors affecting habitat use by fish species in the Platte River, Nebraska. (E.J. Peters, Advisor)

Horticulture

Journal Articles


(J. Series No. 11318)


(J. Series No. 11123)


Role of natural seed infection by the web blight pathogen in common bean seed damage, seedling emergence, and early development. Plant Disease 80:387-390. (J. Series No. 11087)


Registration of 'Nekota' wheat. Crop Science 36:803-804. (J. Series No. 11149)


Expression and characterization of an RNA capping enzyme encoded by Chlorrella virus PBCV-1. J. Virology 70:6638-6644. (J. Series No. 11609)


Induction of apoptosis by the mycotoxins fumonisin B1 and AAL. Proceedings of the National Academy of Science 93:3461-3465. (J. Series No. 11364)


(J. Series No. 11318)


Comparison of aux3 alleles from Pseudomonas syringae pv. glycines. Molecular Plant-Microbe Interactions 10:416-422. (J. Series No. 11626)


Virology 141:185-195. (J. Series No. 11230)

Bacterial Blight and Other Bacterial Diseases of Bean. In: Workshops on Common Bacterial Blight and Other Bacterial Diseases of Bean (M.B. Dickman, Advisor). International Mycological Institute, CAB Press. Ph.D. Dissertations


Book Chapters


Veterinary and Biomedical Sciences

Journal Articles


Flores, E.F., L. Kreutz, and R.O. Donis. 1996. Light microscopic and ultrastructural changes in the ceca of chicks inoculated with human and canine Serpulina pilosicoli. Veterinary Pathology 33:452-454. (J. Series No. 11361)

Human Resources and Family Sciences Departments

Family and Consumer Sciences

Journal Articles


M.S. Theses

Chicoine, J. 1996. Elderly women aging in place. (S. Baugh, Advisor)

Harnapp, V. 1996. Life themes and return to work in disability cases. (J. DeFrain, Advisor)

Hofeldt, J. 1996. Analysis of retirement plans for consumers utilizing women in three age cohorts. (E. Davis, Advisor)

Knight, R. 1996. The influence of supervisor support on work and family spillover. (H. Lingren, Advisor)

Kochner, K. 1996. Surviving the emotional trauma of serious motor vehicle accidents: An exploratory study. (J. DeFrain, Advisor)


Skinner, K. 1996. Division of household labor and child care in urban Chinese families. (W. Meredith, Advisor)

Ph.D. Dissertation


Nutritional Science and Dietetics

Journal Articles


Book


Book Chapters


M.S. Theses


Berggren, J.J. 1996. How exercisers and non-exercisers differ on criteria for exercise dependence. (N.M. Betts, Advisor)


Buck, J.S. 1996. Assessment of hydration status of elderly residents of a long-term care facility. (N.M. Lewis, Advisor)

Fruendorfer, M.A. 1996. Relationship between cognitions concerning food and the body image of restrained eaters. (N.M. Betts, Advisor)

Frederick, A.M. 1996. Effects of low-fat nutrition counseling on nutrient and food habit changes in hypercholesterolemic adults. (N.M. Lewis, Advisor)

Hofferber, L.S. 1996. The development of a valid and reliable nutrition knowledge questionnaire. (N.M. Betts, Advisor)


Klewer, C.L. 1996. The role of self-efficacy in weight loss. (N.M. Betts, Advisor)

Leupold, J.L. 1996. Efficacy of antimicrobial agents incorporated into edible film to control microbial growth. (M.I. Schnepf, Advisor)

Muhe, S.R. 1996. Exercise dependence and its relationship to eating disorders and food consumption patterns of college students. (N.M. Betts, Advisor)

Oerman, M.L. 1996. The ability of restaurateurs to meet the dining needs of people with diabetes. (F.L. Hamouz, Advisor)

Prystai, E.A. 1996. Calcium, copper, iron, magnesium and zinc utilization of humans as affected by consumption of regular black tea, decaffeinated black tea and green tea. (J.A. Driskell, Advisor)

Schalch, K.L. 1996. Effects of omega-3 fatty acid enriched eggs on blood lipids in hypercholesterolemic humans. (N.M. Lewis, Advisor)

Schneller, R.A. 1996. Taste perceptions and dietary habits of smokeless tobacco users and non tobacco users. (J.A. Albrecht, Advisor)

Sulli, K.C. 1996. The effect of antioxidants on the levels of tissue cholesterol and triglyceride in rabbits fed high cholesterol/high fat diets. (J.A. Driskell, Advisor)


Ph.D. Dissertations

Hampi, J.S 1996. The influence of adult literacy on child nutritional status. (N.M. Betts, Advisor)

Horacek, T.M. 1996. The effect of nutrition education and the differences in dietary intake and factors influencing dietary intake according to personality preferences. (N.M. Betts, Advisor)

Textiles, Clothing and Design

Journal Articles


M.S. Thesis

Kim, K. S. 1996. Influence of ethnicity of Nebraska quilts made before World War II. (P.C. Crews, Advisor)

Ph.D. Dissertation


Off-Campus Research Centers

Northeast Research and Extension Center

Journal Articles


Book Chapters


M.S. Theses


Ph.D. Dissertations

Kefi, S. 1996. Interactive effects of gibberellic acid, cytokinin-like compounds, sucrose and daylength on in vitro tuberization of potato (Solanum tuberosum L.) and influences of cytokinin-like compounds on invertebrate activity during microtuberonization. (P.E. Read and A.D. Pavlista, Advisors)

South Central Research and Extension Center

Journal Articles


Ph.D. Dissertations


Seymour, A. 1996. Prediction of European corn borer (Leioptera: Pyralidae) egg and neonate larval survival and microclimate in field corn as affected by irrigation in west central Nebraska. (J.B. Campbell and R.J. Wright, Advisors)

West Central Research and Extension Center

Journal Articles


Book Chapters


M.S. Thesis

Aziz, A.H. 1996. Evaluation of nitrate and chloride leaching, residual soil nitrate distribution and nitrogen uptake under no-till irrigated continuous corn and corn-soybean rotation. (G.W. Herget, Advisor)


Olson, P.A. 1996. Effects of supplementing trace minerals after calving on productivity of 2-year-old cows. (G.H. Deutscher and D.R. Brink, Advisors)

Ph.D. Dissertations

Lamb, J.B. 1996. Plant maturity effects on intake, digestibility and rumen kinetics of leaf and stem fractions of Sandhills grasses in beef steers. (D.C. Adams and T.J. Klopfenstein, Advisors)

Seymour, R. C. 1996. Prediction of European corn borer (Lepidoptera: Pyralidae) egg and neonate larval survival and microclimate in field corn as affected by irrigation in west central Nebraska. (J.B. Campbell and R. J. Wright, Advisors)

Todd, R.W. 1996. Latent heat fluxes of a soybean field measured and simulated by energy balance-combination models. (T.J. Arkebauer and N.L. Klocke, Advisors)

Interdisciplinary Activities

Water Center/Environmental Programs

Journal Articles


Book Chapters


Ph.D. Dissertations


Davis, R.W. 1996. Effect of rodding tips and soil types on distribution of selected insecticides and a water soluble dye when applied for subterranean termite control. (S.T. Kamble, Advisor)

Ma, L. 1996. Impact of artificial groundwater recharge at two Nebraska sites. (R.F. Spalding, Advisor)

ARD receives funding from federal formula funds, industry grants, federal grants and state appropriations. During fiscal year 1996-1997, faculty with ARD appointments obtained grant and contract funds that totaled $20,605,064. This amount represents 50.8 percent of all research grant and contract funds received by UNL. The extramural funds coming to ARD faculty to address problems of importance to Nebraska have a significant direct impact on the state’s economy.

### Report of Research Expenditures

**The University of Nebraska**  
**Agricultural Research Division**  
**July 1, 1996 through June 30, 1997**

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Federal Formula Funds</strong></td>
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<tr>
<td>Hatch Formula</td>
<td>$2,166,466</td>
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<tr>
<td>Regional Research</td>
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<tr>
<td>McIntire-Stennis</td>
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<tr>
<td>Animal Health</td>
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<tr>
<td><strong>Total Federal Formula Funds</strong></td>
<td>$3,231,915</td>
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<tr>
<td><strong>State Appropriated Funds</strong></td>
<td>$27,406,015</td>
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<tr>
<td><strong>Contracts and Grants</strong></td>
<td></td>
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<tr>
<td>USDA Coop Agreements</td>
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<tr>
<td>USDA Special and Competitive</td>
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<td>Federal Grants</td>
<td></td>
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<tr>
<td>(NSF, NIH, USEPA, AID, DOE)</td>
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<tr>
<td>Industry Grants</td>
<td>$5,084,492</td>
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<tr>
<td><strong>Total Grants and Contracts</strong></td>
<td>$15,933,781</td>
</tr>
<tr>
<td><strong>Product Sales</strong></td>
<td>$6,545,352</td>
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<tr>
<td><strong>Total Expenditures</strong></td>
<td>$53,117,063</td>
</tr>
</tbody>
</table>

1 Includes $3,396,890 of Nebraska Research Initiative funds expended by ARD affiliated units.

2 $162,990 was included to show actual Agricultural Research Division expenditures reflecting transfers from International Programs.
Agricultural Research Division
Research Investments by Category and Funding Source FY 1997

<table>
<thead>
<tr>
<th>Expenditure Category</th>
<th>State Appropriated &amp; Hatch Funds</th>
<th>Federal Grants</th>
<th>Industry Grants</th>
<th>State &amp; Revolving Funds</th>
<th>All Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaries, Wages and Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty/Administrative</td>
<td>37.5</td>
<td>5.6</td>
<td>2.0</td>
<td>0.9</td>
<td>22.6</td>
</tr>
<tr>
<td>Managerial/Prof</td>
<td>11.7</td>
<td>8.7</td>
<td>4.6</td>
<td>4.5</td>
<td>9.5</td>
</tr>
<tr>
<td>Office/Service</td>
<td>12.5</td>
<td>10.0</td>
<td>12.7</td>
<td>18.4</td>
<td>12.8</td>
</tr>
<tr>
<td>Hourly Wages</td>
<td>0.7</td>
<td>4.7</td>
<td>9.1</td>
<td>4.0</td>
<td>2.8</td>
</tr>
<tr>
<td>GRA Stipends</td>
<td>5.8</td>
<td>16.3</td>
<td>15.6</td>
<td>1.5</td>
<td>8.4</td>
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<tr>
<td>Benefits</td>
<td>13.3</td>
<td>8.2</td>
<td>6.8</td>
<td>6.3</td>
<td>10.7</td>
</tr>
<tr>
<td>Subtotal:</td>
<td>81.6</td>
<td>53.5</td>
<td>50.8</td>
<td>35.6</td>
<td>66.8</td>
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<tr>
<td>Operating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplies and Expenses</td>
<td>11.6</td>
<td>39.2</td>
<td>31.2</td>
<td>55.9</td>
<td>25.0</td>
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<tr>
<td>Travel</td>
<td>0.6</td>
<td>3.4</td>
<td>6.9</td>
<td>2.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Equipment</td>
<td>6.2</td>
<td>4.0</td>
<td>11.1</td>
<td>6.0</td>
<td>6.2</td>
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<tr>
<td>Subtotal:</td>
<td>18.4</td>
<td>46.5</td>
<td>49.2</td>
<td>64.4</td>
<td>33.2</td>
</tr>
<tr>
<td>Total:</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
### Agricultural Research Division

**Selected Research Program Information**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Information:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projects at beginning of year</td>
<td>362</td>
<td>366</td>
<td>384</td>
</tr>
<tr>
<td>Projects terminating</td>
<td>40</td>
<td>39</td>
<td>44</td>
</tr>
<tr>
<td>Projects revised</td>
<td>9</td>
<td>26</td>
<td>7</td>
</tr>
<tr>
<td>New projects</td>
<td>44</td>
<td>57</td>
<td>47</td>
</tr>
<tr>
<td>Projects at the end of the year</td>
<td>366</td>
<td>384</td>
<td>387</td>
</tr>
<tr>
<td><strong>Faculty full-time equivalents (FTE)</strong></td>
<td>131.9</td>
<td>128.4</td>
<td>126.3</td>
</tr>
<tr>
<td><strong>Expenditures for budgeted research faculty:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal formula and state approp./FTE(^1)</td>
<td>$213,984</td>
<td>$230,157</td>
<td>$242,581</td>
</tr>
<tr>
<td>Grant and contracts/FTE</td>
<td>$118,618</td>
<td>$119,739</td>
<td>$126,158</td>
</tr>
<tr>
<td>Product sales/FTE</td>
<td>$ 54,729</td>
<td>$ 47,236</td>
<td>$ 51,824</td>
</tr>
<tr>
<td><strong>Outputs from research program(^2):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refereed journal articles</td>
<td>286</td>
<td>312</td>
<td>280</td>
</tr>
<tr>
<td>Research bulletins</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Books and book chapters</td>
<td>77</td>
<td>49</td>
<td>54</td>
</tr>
<tr>
<td>M.S. and Ph.D. theses</td>
<td>129</td>
<td>132</td>
<td>139</td>
</tr>
<tr>
<td>Cultivars and germplasm released</td>
<td>17</td>
<td>19</td>
<td>7</td>
</tr>
<tr>
<td>Patents obtained</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

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

\(^2\)A large number of abstracts, technical reports, and other non-refereed articles also are published by faculty each year.
<table>
<thead>
<tr>
<th>SDA-CSREES Goals/Objectives*</th>
<th>Expenditures, %</th>
<th>SYs, % **</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To achieve an agricultural production system that is highly competitive in the global economy</td>
<td>61.9</td>
<td>66.3</td>
</tr>
<tr>
<td>- To produce new and value-added agricultural products and commodities</td>
<td>(25.0)</td>
<td>(25.8)</td>
</tr>
<tr>
<td>- To increase the global competitiveness of the U.S. agricultural production system</td>
<td>(35.0)</td>
<td>(39.5)</td>
</tr>
<tr>
<td>- To improve decision-making on public policy issues related to productivity and competitiveness of the U.S. agriculture production system</td>
<td>(1.0)</td>
<td>(1.7)</td>
</tr>
<tr>
<td>2. To provide a safe and secure food and fiber system</td>
<td>2.9</td>
<td>2.6</td>
</tr>
<tr>
<td>- To improve access to an affordable and healthful food supply</td>
<td>(0.9)</td>
<td>(1.0)</td>
</tr>
<tr>
<td>- To improve food safety by controlling or eliminating foodborne risks</td>
<td>(2.0)</td>
<td>(1.6)</td>
</tr>
<tr>
<td>3. To achieve a healthier, more well-nourished population</td>
<td>0.7</td>
<td>2.0</td>
</tr>
<tr>
<td>- To optimize the health of consumers by improving the quality of diets, quality of food and number of food choices</td>
<td>(0.7)</td>
<td>(2.0)</td>
</tr>
<tr>
<td>4. To achieve greater harmony between agriculture and the environment</td>
<td>27.2</td>
<td>23.2</td>
</tr>
<tr>
<td>- To develop and promote the adoption of efficient and sustainable agriculture, forestry and other resource conservation policies, programs, technologies and practices that ensure ecosystem integrity and biodiversity.</td>
<td>(9.7)</td>
<td>(9.8)</td>
</tr>
<tr>
<td>- To develop and promote adoption of efficient and sustainable agriculture, forestry and other resource policies, programs, technologies and practices that protect, sustain and enhance water, soil and air resources</td>
<td>(17.4)</td>
<td>(13.4)</td>
</tr>
<tr>
<td>5. To enhance economic opportunities and the quality of life among families and communities</td>
<td>2.7</td>
<td>4.5</td>
</tr>
<tr>
<td>- To increase the capacity of communities and families to enhance their economic well-being</td>
<td>(0.5)</td>
<td>(0.8)</td>
</tr>
<tr>
<td>- To increase the capacity of families, communities and individuals to improve their quality of life</td>
<td>(2.2)</td>
<td>(3.7)</td>
</tr>
<tr>
<td>6. Research not related to the CSREES Goals</td>
<td>4.6</td>
<td>1.4</td>
</tr>
</tbody>
</table>

* Goals and objectives of the Cooperative State Research, Extension and Education Service.
** Scientist Year, one scientist working full-time for a year.
"The scientist takes off from the manifold observations of predecessors...selecting here and there the significant stepping-stones that will lead across the difficulties to new understanding. The one who places the last stone and steps across to the terra firma of accomplished discovery gets all the credit. Only the initiated know and honor those whose patient integrity and devotion to exact observation have made the last step possible."

- Hans Zinsser