Agricultural Research Division News & Annual Reports

Agricultural Research Division of IANR

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On the cover: This collage illustrates the Agricultural Research Division’s broad range of research. The work of ARD scientists expands the world’s knowledge base and enhances Nebraska’s agriculture, environment, natural resources, rural communities and the quality of life of all Nebraskans. On the back cover: “Towering to the heavens” is how one pioneer described Chimney Rock, the most recognized landmark on the Oregon Trail. This famous rock pinnacle in western Nebraska, shown here at sunset, guided travelers and settlers headed West. Photography by Brett Hampton; IANR aerial photo.

It is the policy of the University of Nebraska-Lincoln not to discriminate on the basis of gender, age, disability, race, color, religion, marital status, veteran’s status, national or ethnic origin or sexual orientation.
Our Mission

The mission of the Agricultural Research Division in the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln is to conduct problem-solving and fundamental research that addresses priority issues facing Nebraska’s agricultural and food industries; provides the knowledge base essential for managing our natural resources; promotes family well-being and community development; and educates future scientists through hands-on experiences.
It is a pleasure to provide you with a copy of the 112th Annual Report of the University of Nebraska Agricultural Research Division (ARD). This report is our chance to provide you with information about our programs and accomplishments and for us to evaluate the effectiveness of our collective research efforts. After examining this report, we hope that you will agree with our assessment that ARD research has provided new knowledge and technology to Nebraskans to improve the profitability of their enterprises, to enhance environmental quality and to improve their quality of life.

This report provides some highlights of research accomplishments, a listing of 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, 1997 to June 30, 1998. This report was compiled in compliance with the intent of the law of the State of Nebraska that established the Nebraska Agricultural Experiment Station on March 31, 1887.

The ARD is the primary research component of the Institute of Agriculture and Natural Resources (IANR). Currently celebrating its 25th anniversary, IANR was created by an act of the Nebraska Legislature in 1973. During the 25-year period since IANR’s establishment, ARD scientists have made many notable accomplishments including: improved irrigation management through scheduling, development of more accurate nitrogen fertilizer recommendations to minimize groundwater contamination, release of a prolific swine genetic line, development of conservation tillage technology and equipment, release of many improved cultivars of agronomic and horticultural crops, development of restructured meat products, commercialization of a calf scour's vaccine, and development of several industrial uses for agricultural products. Several examples of more recent accomplishments are given in the Research Highlights section of the report.

We continue to be excited about our research programs and the scientists who work to solve today’s problems and help provide the knowledge necessary to address the problems of tomorrow. We welcome your input on our current programs and on your needs for research information.

Darrell W. Nelson
Dean and Director
Agricultural Research Division
The Agricultural Research Division is the only public entity in Nebraska charged with conducting agricultural research. It is part of a national network of state agricultural experiment stations located in Land Grant Universities across the United States. In 1973, the state legislature passed LB 149 which established the Institute of Agriculture and Natural Resources. The Agricultural Research Division was created as one of IANR’s six divisions. The state legislature 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.

Combating E. coli on the farm, ranch and feedlot level

From feedlots to bacterial DNA, IANR scientists are concentrating on preharvest research in an intensive effort to reduce the risk of E. coli 0157:H7, the deadly bacteria responsible for numerous ground beef recalls.

In the year following Hudson Foods massive ground beef recall in August 1997, IANR has collaborated with state government and the beef industry to address the E. coli threat. In April 1998, the legislature passed a bill that provides NU $250,000 annually for five years for basic E. coli research. IANR has garnered several other grants to support this effort.

IANR is concentrating on E. coli at the farm, ranch and feedlot level. This preharvest focus aims to significantly reduce the chances of E. coli 0157:H7 reaching the processing plant. A new multi-disciplinary, statewide research team initiated numerous new projects to study E. coli.

For example, a veterinary scientist heads a project to identify management strategies to help feedlot managers reduce E. coli’s presence in feedlots. Researchers are developing efficient tests to detect 0157:H7 in groups of cattle because testing each animal isn’t practical. Tests will help identify groups of cattle carrying the bacteria, determine the environmental factors that encourage 0157:H7 in feedlots, and develop management strategies that discourage the bacteria.

Understanding E. coli’s genetics, physiology and biochemistry, and how it survives in cattle are other targets of preharvest research for scientists in food science and technology, animal science, veterinary science, the Beadle Center and the School of Biological Sciences.

IANR peanut allergen test commercially available in 1998

People with peanut allergies can be more confident that foods on the store shelf are safe for them to eat.

IANR food scientists developed a fast, accurate test to detect traces of peanut allergens in processed foods. The test became commercially available in 1998. A Michigan company is marketing the test to the food industry under a university licensing agreement.

The peanut test is one of several highly powerful, highly sensitive tests for food allergens that IANR’s food allergy research team is developing. New tests for egg and casein (a milk component) allergens should be commercialized in 1999. Tests for soybeans and tree nuts are in the works.

The tests detect cross-contamination, allergenic food residue that contaminates another food processed on the same equipment. Processing different foods on the same equipment is common and economically necessary. Processors clean equipment to prevent cross-contamination, but they’ve lacked a thorough way to detect minute amounts of residue.

NU’s program is one of the few nationwide focusing on food allergies from a food industry perspective. Industry teamed with the university for help with this major concern.
The financial capacity index helps in ranking Nebraska’s 439 incorporated towns under and determining their ability to pay income distribution and property valuation per household, this more level playing field for rich but income-poor towns.

Researchers assessing a community’s ability to find funding for improvements

IANR research could help assure that the neediest communities receive shrinking government dollars for sewer, water and other public projects or services.

Traditionally, governments primarily use median household income for awarding communities such grants, meaning towns with low household income are more likely to get financial assistance.

In the real world, a town’s ability to fund improvements is more complex. An IANR agricultural economist developed a formula, called a financial capacity index, that factors in both wealth and income. He thinks it provides a more realistic community economic snapshot and a more level playing field for awarding grants.

By calculating a community’s per capita income, household income distribution and property valuation per household, this financial capacity index helps adjust for differences in property-rich but income-poor towns.

The index is based on studying Nebraska’s 439 incorporated towns under 5,000 population and ranking their ability to pay for sewer and water services. Taking wealth and income into account may show that towns traditionally considered poor may be better able to pay for public services than current formulas assume.

Small towns face higher costs and/or reduced services unless state or local governments adopt more efficient funding methods or boost existing funding for public projects or services. This formula might help make tough funding decisions.

The research could apply to other policy issues, such as state education aid or welfare and tax reform.

Scientists creating wheat with broad viral resistance

An IANR molecular biologist’s idea to borrow genes from mammals to protect wheat plants against deadly virus diseases is proving effective.

Using an array of biotechnology techniques, researchers inserted two genes from a mammalian anti-viral system into wheat plants. The transgenic plants grow, reproduce and, most importantly, show resistance to destructive wheat streak mosaic virus.

The system still must be tested against other significant wheat viruses. However, researchers are optimistic, because it worked against seven different viruses in tobacco plants.

Controlling multiple viruses is much more difficult than the usual practice of instilling disease-specific resistance, but it translates into money in farmers’ pockets. In the field multiple viruses attack wheat, so broad resistance is important. Nationwide, losses from wheat streak mosaic and three other wheat viruses cost growers $230 million to $450 million annually.

In a typical year 10 percent of the wheat is infected in west central Nebraska and the Panhandle, where wheat streak mosaic is most common.

Researchers are testing second-generation transgenic wheat plants for disease resistance. Those tested so far show varying resistance to wheat streak mosaic virus.

Research is yielding better ways to scout weeds in the field

To make informed weed management decisions, farmers need to know where and how many weeds are in fields. That’s tricky because weeds tend to be scattered and patchy.

Improved IANR scouting recommendations that account for weed distribution and growth characteristics should help more accurately assess weed infestations. These recommendations are based on NU weed science research that is yielding comprehensive scientific information about how, where and why different weeds grow in typical farm fields.

The new scouting recommendations involve dividing fields into four blocks and checking weeds in five sites per block. This approach more accurately reflects weed variability than scouting field edges or only a few spots.

Scouting 20 sites shows spatial differences such as problem patches and weed-free areas. Farmers can decide whether to treat the field uniformly based on average weed conditions or to tailor site-specific controls.

Some producers and crop consultants scout fields more intensely. More information is better, but IANR weed scientists wanted to devise a method practical for most growers.

These improved scouting techniques have been incorporated into WeedSOFT, NU’s weed management software program, which is used to manage weeds on more than a half million Nebraska crop acres.

Scouting recommendations and other findings from this
Weed Scientist Dave Mortensen counts weeds within a sampling area of a soybean field. Intensive weed sampling and mapping is part of the research that is providing comprehensive scientific information about weed distribution, densities and growth patterns in typical fields. One research outcome already is being used in Nebraska fields.

Research encourage a more information-intensive approach to managing fields so farmers can match controls to the biology of the weed population.

Weed scientists say farmers with accurate weed information often have more control options, which can mean less herbicide and lower per-acre costs.

**Trying to make warmed-over flavor a thing of the past**

Remember that warmed-over flavor that is the essence of the chicken cordon bleu frozen dinner? IANR researchers are developing products and processes to help make warmed-over flavor a taste of the past.

IANR nutrition scientists hypothesized that protecting frozen food from oxygen would prevent the oxidation of fat compounds that causes warmed-over flavor. This seemed an ideal use for the edible films being developed and tested by IANR researchers in Biological Systems Engineering and Food Science and Technology.

Edible films use starches and proteins from Nebraska's top crops — corn, wheat, soybeans and sorghum — and other agricultural products to make plastic-like sheets. These environmentally friendly films may replace polyethylene and other non-degradable films for selected uses.

IANR researchers are testing physical properties of different films: how easily they tear and whether they are barriers to water and oxygen movement.

Widespread use of edible films depends on successful research showing their functionality: that's where warmed-over flavor comes in.

Researchers combat warmed-over flavor three ways: wrapping cooked pork chops or hamburgers in edible films, mixing antioxidants into ground beef, and permeating films with antioxidants. An IANR food scientist is studying naturally occurring antioxidants produced in plant tissue cultures that could be used on the edible films.

Interest growing in cards from corn

That prepaid phone card in your wallet looks and feels like plastic, but it may come from corn.

NU Industrial Agricultural Products Center researchers developed a degradable additive and a process for blending it with commercially available polylactic acid (PLA) resin, made from cornstarch. Combining the additive, called Soft-Touch II, with PLA produces a plastic perfect for making credit cards and prepaid phone cards.

The university has filed U.S. and international patents on Soft-Touch II and the production process.

These new cards look, feel and perform like conventional petroleum-based plastic cards with one environmentally friendly twist. Pitch them in the compost instead of the garbage when they expire and they'll disappear in six to eight weeks. Conventional cards made from polyvinyl chloride (PVC) take thousands of years to degrade in landfills.

PLA, a versatile bioplastic resin, tends to be very hard or soft. Phone and credit card production requires a somewhat flexible material that cuts and prints easily. The center's invention enhances PLA for this use.

The center developed the process when a central Nebraska entrepreneur sought help making compostable prepaid phone cards. This company, CornCard International, now markets compostable phone cards under the trade name Mazin.

With 6 billion plastic cards produced annually worldwide and a predicted volume of 9 billion by 2001, the market for compostable cards looks promising. Europe is banning PVC plastics so environmentally friendly alternatives must be used by 2000.
Sorting out the roles of different fats in heart disease

By studying fats’ role in heart disease, an IANR researcher has found a significant piece of the puzzle behind Nebraska’s and the nation’s leading cause of death.

For years, high cholesterol levels have been considered a major heart disease risk. A nutritional scientist in the NU College of Human Resources and Family Sciences entered a new area of heart disease research by studying how fats affect the liver.

He discovered that saturated fats aren’t equal. Saturated fats in beef and cocoa butter discourage cholesterol absorption. The cholesterol-raising palmitic acid in saturated fats such as palm, coconut and other tropical oils promotes the disease.

His earlier research showed that monounsaturated fats, such as those in olive oil, speed cholesterol’s move from the liver into the bloodstream, increasing cholesterol levels and heart disease risk.

Although fats aren’t equal, they all are calorie dense. Research suggests that most Americans should follow the time-tested adage of eating a balanced diet with fewer calories.

This animal-model research eventually could help explain how heart disease progresses in humans. That’s significant because people often don’t know they have the disease until they have a heart attack.

Researchers studying adults who survived traumatic childhoods

Many adults repeat the abusive behaviors they endured as children with their own children. Many don’t.

IANR family scientists studied those who don’t repeat the abuse cycle in an effort to understand how they survived and transcended traumatic childhoods.

College of Human Resources and Family Sciences researchers didn’t intend to focus only on emotional, physical or sexual abuse survivors, but they found that abuse was an integral part of almost every traumatic childhood. In 89 of the 90 cases studied, at least one aspect of trauma was abuse.

Respondents were asked to categorize traumatic life events by checking applicable items on a list of 22 events ranging from abandonment and discrimination to war, poverty and sexual abuse. Some checked as many as 19 events.

Eighty-three percent of respondents said they survived and transcended their childhood trauma, 11 percent said they only survived, and 6 percent didn’t answer.

Survivors described many different coping mechanisms. Seventy percent said developing a spiritual life was helpful, although their views on organized religion varied. Connecting with good people, becoming a high achiever in a career or in school and forgiving one’s parents were common paths for coping, researchers found.

About 61 percent had some experience with professional counselors, but many preferred attending support groups with others who survived similar traumas.

Sandhills spring meadow grazing jump-starts cattle

Spring grazing on the Nebraska Sandhills’ lush wet meadows benefits cattle and offers ranchers management flexibility, a three-year study by IANR agronomists found.

In early May, wet meadows have a luxuriant new green growth of Kentucky bluegrass, timothy, bromegrass, wheatgrass and other cool-season species—a great spring, high quality replacement for hay.

Extending the grazing season cuts ranchers costs by minimizing hay costs, which account for 18 to 24 percent of the total expenditure of producing a weaned calf.

In the spring meadow grazing treatment, cattle grazed meadows from May 10 to June 10, then grazed range from June 11 to Oct. 6. Cattle in a traditional treatment were fed hay from May 10 to June 10 and then grazed range.

Researchers found meadows produced about the same amount of forage, regardless of grazing or harvest strategy. The real differences appeared in crude protein yield and content.

Meadows grazed in May had a good protein content of 13 percent when cut for hay on July 25. Hay from ungrazed meadows had a crude protein content of 9 percent.

Cattle fared better on spring meadow grazing. Calves grazing meadows gained 20 more pounds in May than those on hay. Cows that started on meadow grazing scored better for body condition and kept that good condition through the summer.
Using herbicide makes wildflowers easier to establish

Homeowners may want to plant wildflowers in their landscapes, but too often what was meant to be a prairie-like mix of grasses and wildflowers ends up as a weed patch.

Weed competition is the biggest problem in wildflower establishment. IANR horticulturists, a USDA Agricultural Research Service range scientist at NU and agronomy graduate students tested a herbicide treatment that beats out weeds, making native wildflower and grass establishment simpler and more reliable.

Because prairies mix grasses and broadleaf wildflowers, herbicides have not been useful for controlling weeds in prairie plantings. Most herbicides selectively target either grasses or broadleaved plants such as wildflowers, or non-selectively kill both types of plants.

The IANR researchers found that ‘Plateau’ herbicide, recommended for control of broad-leaves and grasses, didn’t affect composites or legumes, plant families that include many prairie wildflowers.

They screened six native wildflowers and grasses for their tolerance to the herbicide and developed an application rate that could be recommended specifically for wildflower establishment. The herbicide reduced weed competition and the time required for wildflower establishment, researchers found.

The best use for the herbicide is for large areas, such as ares, roadsides and golf course roughs, where some damage can be tolerated.

The herbicide’s manufacturer is expected to market a two-acre size package of Plateau for homeowners and landscape professionals in 1999.

Tracking Pine Ridge elk aids wildlife management

A helicopter-powered elk roundup in western Nebraska’s Pine Ridge was the first step in a three-year IANR study of Nebraska’s elk population.

A commercial capture team hobbled 16 elk in 1994, tagged their ears and fitted them with heavy-duty, battery-operated radio collars. The radio collars emit a radio frequency once every second, allowing scientists to track elk movements.

Researchers made more than 10,000 readings using the radio collars during the study.

Wildlife biologists in UNL’s School of Natural Resource Sciences teamed with the Nebraska Game and Parks Commission, the U.S. Forest Service and the Rocky Mountain Elk Foundation as part of the Nebraska Elk Management Plan. The project studied the habits and structure of Nebraska’s elk population, the effect of human practices on the elk and the attitudes of landowners, hunters and tourists toward the big animals.

Researchers estimated the size of the elk population, determined the animals’ age, sex and health and tracked their seasonal distribution and habitat use. They spotted about 150 elk in Pine Ridge and estimated that the actual number is between 175 and 225.

Documenting how and where elk spend their time allows wildlife managers to make informed decisions about protecting the elk and their habitats.

Chicory a potential alternative crop for the Panhandle

A new food ingredient made from chicory root could translate into an alternative crop option for western Nebraska producers.

NU Panhandle Research and Extension Center researchers have studied the feasibility of growing chicory, a blue-flowered plant that resembles sugar beets, under western Nebraska conditions. Chicory, like sugar beets, is a root crop, but it is genetically unrelated, making chicory resistant to most sugar beet pests. IANR research showed that Nebraska’s sugar beet producers could grow chicory with minor adjustments in machinery and farming techniques.

Chicory production looks promising because its root contains inulin, a new food ingredient that enhances low-fat or fat-free foods. The food industry is interested in inulin’s potential as a substitute for high calorie, fat-based food ingredients.

Low- and fat-free foods lack fat’s “texturing” properties and have less texture, mouth-feel and flavor. Inulin, a fructose-based polymer, forms a creamy, fat-like gel when dissolved in water and provides body and texture for prepared foods.

The pharmaceutical industry also may be interested in inulin. It helps stimulate beneficial bifido bacteria in the lower intestine. Its low-sugar qualities also make it useful for diabetic diets.

A private company, Cascadian Inulin, operated a small pilot inulin extraction plant at the center before moving to private-quarters in fall 1998. The center produced 5 acres of chicory for the pilot plant. Processing techniques have been perfected to extract high quality inulin from Nebraska chicory.

Chicory probably can be grown almost anywhere that sugar beets are produced. This IANR research aims to give Nebraska a head start on other U.S. beet-producing areas. If successful, western Nebraska will be the first to produce domestic inulin.
Vet scientists target devastating viral swine disease

An IANR veterinary science team has led the way in characterizing a devastating viral swine disease and conducting research trials of a vaccine.

Porcine Reproductive and Respiratory Syndrome (PRRS) costs swine producers in the United States, Canada and Europe millions of dollars annually. PRRS symptoms include infertility, abortions, severe pneumonia in baby pigs, encephalitis and heart problems. Sometimes entire litters are born dead.

IANR researchers have discovered that the virus causes infertility in boars by killing cells in the testicles. They also were the first researchers to find the virus in sows’ ovaries.

Other research focusing on how the virus is transmitted has discounted initial theories about airborne transmission. Pig-to-pig contact, from an infected animal being introduced to a herd, is the No. 1 way the virus is transmitted, researchers found. Scientists continue to study how long the virus can be maintained in the pig’s body and still cause disease, information needed for breaking the infection cycle.

Researchers say the best protection against PRRS is good management and sanitation practices.

PRRS vaccines are available. The IANR team conducted research trials for a vaccine now marketed by Schering Plough Animal Health Inc.

Three-year fallow rotation system cuts wheat weed woes

Switching to a three-year fallow rotation system can help western Nebraska wheat growers solve one of their biggest weed problems, a seven-year study at NU’s Panhandle Research and Extension Center shows.

Downy brome, jointed goatgrass and winter ryegrass are among the weeds that have dominated field edges and corners. These weeds also have the same life cycle as winter wheat, so these plants cannot be destroyed when they grow with wheat. The grasses go to seed, leaving a crop of weed seeds in the fallow field the following summer.

This study included two-year wheat fallow rotations with two different fallow tillage treatments to control weeds: herbicide application in the fall with shallow tillage in the summer, and shallow tillage in fall and summer.


After six years, wheat in the three-year rotation had 1/100 the number of weeds in the two-year rotation. The different three-year systems were equally effective.

Researchers believe that switching to a three-year rotation would end the weed problem. They’re studying what crops could be added for a profitable three-year rotation.

Brighteners boost sun-blocking power of clothing

Choosing laundry detergent with optical brighteners can boost the clothing’s sun-blocking ability, NU textiles science research shows.

Outdoor gear enhanced with sun protection claims to help block the sun’s ultraviolet rays. UV rays can lead to reddening skin, wrinkles, premature aging and skin cancer.

A textiles scientist’s preliminary research showed that adding a UV absorber finish to fabrics enhances their sun protection properties, blocking UV radiation from reaching skin under the fabric. The scientist also discovered something surprising: washing cotton fabrics repeatedly in a detergent with brightening agents actually enhanced the fabrics’ sun protection levels.
Most liquid or powdered commercial detergents contain these brighteners. They absorb UV rays and bounce them back as a bluish light, giving white textiles the bright blue-white most consumers consider clean.

Researchers calculated a fabric’s sun-blocking abilities and assigned UPF (ultraviolet protection factor) ratings, similar to sunscreen’s SPF (sun protection factor) ratings. For example, a knit cotton T-shirt’s UPF rating jumped about six times, from 6.5 to 38.4, after 20 washes.

The IANR researcher hopes to develop an accurate, simple test manufacturers could use to evaluate UV protective clothing. The test could lead to a label rating to aid consumers.

Modifying microbes might decrease ammonia waste

Excess nitrogen in animal waste is becoming an important environmental concern for beef producers. IANR animal scientists are working to solve the problem by modifying bacteria in the digestive systems of cattle.

Cattle don’t digest food on their own. They need help from bacteria in the rumen, the large first compartment of their complicated digestive systems.

When cattle eat protein-rich diets, these bacteria break down protein into ammonia, a nitrogen compound. They re-use ammonia to make new proteins, which aid bacterial and cattle growth. But ruminal bacteria are too efficient: they often produce more ammonia than they use. Excess ammonia becomes waste, excreted in cattle’s urine. It can make up as much as 25 percent of the animal waste nitrogen in the environment.

The researchers aim to slow down the ammonia production of these organisms in the rumen. That might allow producers to feed less nitrogen while still meeting animals’ needs.

They are using biotechnology techniques to develop mutant forms of a key ruminal bacterium lacking an enzyme that has been shown to be one of the major protein digesting enzymes in the rumen.

When grown in laboratory cultures with another ammonia-producing bacterium, the mutant bacteria reduced ammonia production 25 percent, showing its important role in controlling ammonia production. The mutant bacteria should aid studies of the enzyme’s structure and function, and strategies to inactivate it.

Prolific swine line rare public release

A highly prolific line of pigs developed during 16 years of landmark IANR swine reproductive research became available to commercial breeders in 1997 through a rare public release.

Companies that purchased pigs from the Nebraska Index Line are evaluating their potential for use in commercial breeding programs. Semen from the line’s boars was used to father 600 females participating in the National Pork Producers Council Maternal Genetic Evaluation Program.

It is believed to be the only university-developed swine line released to commercial industry in the last 30 years.

The line is the result of 15 generations of persistent genetic selection to increase litter size. Developed for research on genetic characteristics affecting litter size, the line is one of the few of its kind in the world. Sows from this line produce an average of 2.1 more live pigs per litter than a control line typical of today’s herds.

Although the line was developed for research, IANR animal scientists who worked on this project recognized its commercial potential.

NU invited a group of industry representatives to help establish release procedures and to make the line’s unique genetics available to commercial breeders before releasing pigs.

Designing systems that can tell weeds from crops

Computers are mighty powerful, but getting them to see things as humans do is a big challenge.

IANR biological systems engineers and weed scientists are attempting to imitate human perception as they program computers to distinguish weeds from crops. They want to design an advanced machine vision system that analyzes a visual signal from a camera to determine if the object pictured is weed, crop or soil.

Such a system someday might become the computerized eyes and brain of a herbicide sprayer rig that would turn on momentarily only if it spotted a weed.

Researchers elsewhere are working on optical sensors to distinguish between soil background and plants to target weeds growing between crop rows. IANR researchers are taking this idea another step, developing systems that detect and identify different plant species, especially weeds.

Their aim is a system that categorizes plants by species, using identifying characteristics such as shape, canopy, leaves, color and texture. They’ve developed software to aid this effort.

So far, the system works best on young plants with new, fully exposed leaves near their canopy. Mature plants are tougher to distinguish because leaves in their complex canopies overlap and create shadows.

It’s a perplexing computer science problem, but success could yield economic and environmental benefits. A system that knows weeds from crops could make it easier to spot spray weeds after they come up instead of treating entire fields before weeds emerge. Such spot treatment could reduce herbicide use.
A Few More Glimpses at ARD Research ...

- Regular exercise is a good habit, but too much may indicate a problem. An IANR nutrition scientist devised the Exercise Habits Inventory, a questionnaire to help identify possible cases of exercise dependence syndrome and to determine how exercise and eating disorders are related. Tests done since 1993 support the inventory’s validity. When researchers conducted eating attitudes tests along with the inventory, they found strong links between eating habits and exercise dependence.

- Golf course superintendents and homeowners weary of mowing and watering may want to consider three new turf-type buffalograsses released by NU. The newcomers, called 91-118, 86-61 and 86-120, are the latest result of ongoing IANR research to develop environmentally friendly, low-maintenance turfgrasses. They need half the water and fertilizer and far less maintenance than most conventional turfgrasses. Variety 91-118’s cold hardiness, good sod production and turf quality should interest golf course operators. The other two varieties are well-suited to home lawns.

- Range recovers quickly from fire, but there are dramatic changes. While some types of vegetation increased, an IANR range scientist at NU’s West Central Research and Extension Center found fire is tough on little bluestem, an important forage grass. A year after fires on three Sandhills ranches, researchers found little bluestem declined 75 percent from pre-fire levels. By the second year after the fires, little bluestem was coming back. This research should yield recommendations on the best grazing deferment strategies to help range recover from fire.

- Many rural business leaders view information technology as crucial to community survival. They say education on using this technology is a high priority, an IANR survey found. NU’s Center for Rural Community Revitalization and Development teamed with Nebraska’s Division of Communications to survey business people on computer experience and expectations. Believed to be the nation’s first look at a state’s computing education needs, the survey will help policy-makers target training needs.

- A 5-year IANR study of how calf weaning dates affect profit potential and cow performance tracked trade-offs associated with calves weaned at 5, 7 and 9 months. Weaning typically is at 7 months. Animal scientists found early weaning cows weighed more and were in better body condition at calving than normal and late weaning cows. However, early weaned calves weighed less at weaning than normal or late weaned counterparts. Early weaning shifts nutritional needs from cow to calf. Producers must decide how much calf weight they can sacrifice to reduce cows’ feed inputs and still remain profitable.

- Deciding what to plant can be the difference between profit and loss. An IANR cropping systems researcher is working on a computer program that someday could help producers make complex production decisions. One system he’s developing uses a weather simulator to calculate the probability of different weather patterns, including periods of drought and adequate moisture. The aim is to help farmers anticipate a range of possible weather for the next growing season so they can make the best possible decisions. Eventually, researchers foresee developing decision-support systems that tap into on-line soil, weather, economic and other data to provide site-specific risk assessment tools.

- Carefully formulating the amount of protein in cattle and swine diets can reduce the nitrogen waste released into the environment and sometimes can reduce feed costs, several IANR animal science studies show. Studying how efficiently beef and dairy cattle, and swine use dietary protein, researchers found that rations often supply too much protein. Animals can perform well on less protein and produce less nitrogen waste.

- Nearly 80 percent of Nebraska’s roughly 2 million wheat acres are planted to varieties developed by NU’s joint IANR-USDA breeding program. It’s estimated that planting these improved NU wheat varieties boosts growers’ incomes by more than $40 million annually.

- Sometimes it pays to be flexible. An IANR agricultural economist and a visiting agronomist are developing a worksheet to help farmers decide whether they’d benefit from adjusting planting plans to predicted weather and financial conditions. They want to make it easier to assess potential payoffs from different crops for a given year based on preseason moisture, soil nitrogen levels, projected yields and futures market prices. They don’t recommend farmers abandon longer-range planning but, they say, planting flexibility might pay off in certain years. The worksheet could be available within a year.

- Pork producers can reduce water waste and manure volume by matching watering devices to their waste storage system’s overall goals, research at NU’s Northeast Research and Extension Center shows. An IANR swine scientist studied different types of commercially available waterers, documenting waste volume and pig performance. Based on this research, he recommends that specification of watering devices become more critical in planning swine facilities.
Faculty Awards and Recognitions

The impact and quality of ARD research can be assessed in many ways. One measure of excellence is the recognition researchers’ work receives from peers and from those who benefit from the research. A number of ARD faculty members are widely recognized as leaders in their disciplines, and a number received international, national, regional and/or state honors.

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

**Agronomy**

- **P. Stephen Baenziger** received the Agronomic Crops Award from the American Society of Agronomy.
- **Kenneth G. Cassman** received the Fellow Award from the Soil Science Society of America.
- **Charles A. Francis** received the Agriculture Stewardship Award from the Nebraska Sustainable Agriculture Society.
- **Jerry W. Maranville** received the Fellow Award from the American Society of Agronomy.
- **Jeff Pedersen** received the Fellow Award from the Crop Science Society of America.
- **James F. Power** received the Hugh Hammond Bennett Award from the Soil and Water Conservation Society.

**Animal Science**

- **Mary M. Beck** received the Outstanding Contribution to Status of Women Award from the Chancellor’s Commission on the Status of Women.
- **Larry V. Cundiff** received the Excellence in Research Award from the University of Nebraska-Lincoln Chapter of Gamma Sigma Delta and the Pioneer Award from the Beef Improvement Federation.
- **Robert M. Koch** received the Award of Merit from the University of Nebraska-Lincoln Chapter, Gamma Sigma Delta.
- **Richard K. Koelsch** received the Pork Industry Service Award from the Nebraska Pork Producers Association.
- **Thomas W. Sullivan** was inducted into the Hall of Distinction at Arkansas Tech University.
- **Animal Science Department Dairy Research Herd** received the All Nebraska Dairy Herd Improvement Association Premier Breeder & Producer Award from the Nebraska Holstein Association.

**Biological Systems Engineering**

- **Thomas G. Franti** received two 1997 Superior Paper Awards from the American Society of Agricultural Engineers.
- **Milford A. Hanna** received the Engineering College Faculty Research Award from the College of Engineering and Technology.
- **LaVerne Stetson** received the Outstanding Contribution to Nebraska Agriculture Award from the Nebraska Section of the American Society of Agricultural Engineers.
- **Darrell G. Watts** received the USDA Group Honor Award for Excellence as Management Systems Evaluation Area (MSEA) Principal Investigator from the United States Department of Agriculture.
- **Wayne E. Woldt** received the Best Paper Presentation Award at the American Society of Agricultural Engineers' Mini Conference on Emerging Technologies in Hydrology.

**Entomology**

- **Scott Hutchins** received the Outstanding Young Alumnus Award from the Iowa State University Alumni Association.

**Family and Consumer Sciences**

- **John DeFrain** received commendation for the Parent Aide Support Service Program (supporting child abuse and neglect treatment/prevention program) from the Department of Health and Human Services, State of Nebraska.
- **Carolyn Pope Edwards** received the Invited Fellow Award for the Centre for Advanced Study from the Norwegian Academy of Science and Letters, Oslo, Norway.

**Athletics**

- **Thomas E. Moore** received the Outstanding Contribution to Status of Women Award from the Chancellor’s Commission on the Status of Women.

**Biology**

- **Jerry W. Maranville** received the Fellow Award from the Soil and Water Conservation Society.

**School of Natural Resource Sciences**

- **Kyle D. Hoagland** received the Initiative Team Award from the Institute of Agriculture and Natural Resources.
- **Shripat T. Kumble** received the Award of Merit from the North Central Branch of the Entomological Society of America.

**Veterinary and Biomedical Sciences**

- **Fernando Osorio** received a Fulbright Scholarship to teach and study in Brazil from the United States Information Agency.

**Northeast Research and Extension Center**

- **John Witkowski** received the ASAE Blue Ribbon Award from the Nebraska Soybean Field Guide.
- **David P. Shelton** received the ASAE Blue Ribbon Award from the Nebraska Soybean Field Guide.

**Panhandle Research and Extension Center**

- **David D. Baltensperger** received the Fellow Award from the American Society of Agronomy.
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 699 graduate students are pursuing advanced degrees with ARD faculty. The quality of our graduate students is reflected in the recognition they receive.

**Animal Science**

Christi M. Calhoun received a travel grant award from the Nebraska Chapter, Sigma Xi; a second place award in the Ph.D. poster competition from the American Meat Science Association and was a member of the UNL team that won the Product Development Competition with its product “Twist Steak” from the International Food Technologists Student Association.

Galen E. Erickson received the Vincent H. Arthaud Travel Award from the Department of Animal Science.

Karol E. Fike received the John Hallman Memorial Award from the Department of Animal Science.

Robert L. Fischer received the Mary and Charles C. Cooper/Emma I. Sharpless Fellowship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division.

Tannya R. Fojtik received the Vincent H. Arthaud Travel Award from the Department of Animal Science.

Sergio Gomez received the Vincent H. Arthaud Travel Award from the Department of Animal Science.

Mark J. Klemesrud received the third place award in the graduate student paper competition from the Midwest Section, American Society of Animal Science/American Dairy Science Association.

Bradley R. Lindsey received the graduate student paper competition award from the Nebraska Chapter of Sigma Xi.

Humberto Madeira received a Graduate Associateship from the Center for Biotechnology.

Curtis L. Novak received a scholarship from the American Feed Ingredients Association.

Bernadette M. O’Rourke received the Vincent H. Arthaud Travel Award from the Department of Animal Science and was awarded second place in the M.S. poster competition at the American Meat Science Association meetings.

Timothy D. Schnell received the National Pork Fellowship from the National Pork Producers Council, a Fellowship from the Institute of Food Technologists, and was member of the UNL team that won the product development competition with its product “Twist Steak” from the International Food Technologists Student Association.

**Biochemistry**

Rebecca K. Splan received the Frank Baker Essay Contest Award from the Beef Improvement Federation and the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Zhiqiang Chen received the American Heart Association Fellowship from the Nebraska Chapter of the American Heart Association.

Sumedha Gulati received the American Heart Association Fellowship from the Nebraska Chapter of the American Heart Association, the Outstanding Poster Award from the Federation of the American Society of Biochemists and Molecular Biologists, the Ed and Clara Degering Fellowship from the University of Nebraska Foundation, and the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

**Entomology**

Jon C. Bedick was given a master poster award at the North Central Branch Entomological Society of America meetings; received a research grant from the Center for Great Plains Studies and was on the second-place team in the Linnæan Games Team competition at the North Central Branch Entomological Society of America meetings.

**Biological Systems Engineering**

Ajoy P. Koppolu received the Milton E. Mohr Research Fellowship from the University of Nebraska College of Engineering and Technology.

Glenn L. Rosenhamer received the Milton E. Mohr Research Fellowship from the University of Nebraska College of Engineering and Technology.

Walter S. Gorneau received the Milton E. Mohr Research Fellowship from the University of Nebraska College of Engineering and Technology.

Karen R. Lochte-Watson received the Graduate Student of the Year award from the Mid-Central American Society of Agricultural Engineers Conference.
Thomas Clark received a Bukey Memorial Fellowship from the Office of Graduate Studies; Graduate Student Award for Leadership in Applied Entomology from the Entomological Foundation, sponsored by Dow Elanco; a Donald Walters Miller Fellowship from the Office of Graduate Studies; and was on the second-place team in the Linnaean Games Team competition at the North Central Branch Entomological Society of America meetings.

Christina Davis received a Mary and Charles C. Cooper/Emma I. Sharpless Fellowship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division.

Fikru Haile received a Henry F. and Jean D. Holtzclaw Fellowship from the Office of Graduate Studies; a Mavel J. Reichenbach Fellowship from the Office of Graduate Studies; a Hardin Distinguished Graduate Fellowship from the Agricultural Research Division; and was on the second-place team in the Linnaean Games Team competition at the North Central Branch Entomological Society of America meetings.

Tiffany Heug-Moss was awarded second place for her master poster presentation at the North Central Branch Entomological Society of America meetings; a Mary and Charles C. Cooper/Emma I. Sharpless Fellowship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division; a Mabel Reichbach Fellowship from the Office of Graduate Studies; and was on the second-place team in the Linnaean Games Team competition at the North Central Branch Entomological Society of America meetings.

William Wyatt Hobaek received a Milton E. Mohr Fellowship; was awarded first place for his poster presentation and was on the second-place team in the Linnaean Games Team competition at the North Central Branch Entomological Society of America meetings.

Thomas Hunt received a Widman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Pari Pachamuthu received a Ward A. and Helen W. Combs Scholarship sponsored by Presto-X Company.

Mario Urias-Lopez received a scholarship from Pioneer Hi-Bred International, Inc.

Food Science and Technology

Doug Christensen received the Institute of Food Technologists Graduate Fellowship.

Brenda Waite received the Institute of Food Technologists Graduate Fellowship.

Horticulture

Kevin W. Frank received the Mary and Charles C. Cooper/Emma I. Sharpless Fellowship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division; the Bukey Memorial Fellowship from the University of Nebraska Graduate College; and the Donald Walters Miller Fellowship from the University of Nebraska Foundation.

C. Rebecca W. Wynne received the Mary and Charles C. Cooper/Emma I. Sharpless Fellowship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division.

School of Natural Resource Sciences

James W. Austin received a research scholarship and national certificate from the National Urban Entomology Group.

Georgiy (George) G. Burba received the Widman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Intiyaz Khan was inducted into the Nebraska Chapter of Gamma Sigma Delta.

Pari Pachamuthu was awarded first place for a research paper presentation from the North Central Branch of the Entomological Society of America.

No-Joong Park was awarded first place for a research paper presentation from the North Central Branch of the Entomological Society of America.

Veterinary and Biomedical Sciences

Laxminarayana Devireddy received the Widman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Nagendra Hegde received the Joseph J. Garbarino Achievement Award from the Animal Health Institute Foundation.

Christina Topliff received the American College of Veterinary Microbiologists Outstanding Graduate Student Presentation award at the Conference of Research Workers in Animal Disease.

M. Teresa Winkler received an NIH grant to attend the 22nd International Herpesvirus Workshop.

Nutritional Science and Dietetics

Yi Wu received the Widman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.
The purpose of this new program is to allow outstanding University Honors Program students to conduct research under the direction of a faculty mentor. The program is open to junior and senior Honors Program participants proposing to work with a faculty member who has an ARD appointment. A subcommittee of the ARD Advisory Council selects awardees based on the quality of the proposal. Proposals are authored by the students with guidance from the proposed project mentors.

Agricultural Economics


David Drozd. The impacts of large hog confinement use. (J.C. Allen, Advisor)

Wade Johnson. The social and economic impact of the proposed highway construction and potential business development north of Columbus, Nebraska on agricultural producers and rural residents. (J.C. Allen, Advisor)

Agricultural Leadership, Education and Communication

Karyn Lane. Breadth of content of elementary environmental education programs. (S.M. Fritz, Advisor)

Animal Science

Edward Cargill. Chromosome location of a recessive cataract mutation in mice. (M.K. Nielsen and D. Pomp, Advisors)

Carin Ramsel. Acylation stimulating protein and fat synthesis in pig. (J.L. Minor, Advisor)

Jennifer L. Strickland. Effect of selection for energy expenditure on brown adipose tissue function in mice. (J.L. Minor, Advisor)

Biochemistry

Amy Lawson. A molecular-based examination of some of the factors affecting cellulose degradation by Ruminococcus albus. (M. Morrison, Advisor)

Carolyn M. O’Brien. Interactions between rubisco and rubisco activase. (R.J. Spreitzer, Advisor)

Biological Systems Engineering

Mark C. Stone. The evaluation of a constructed wetland system for rural-residence wastewater treatments in Nebraska. (W.E. Woldt and D.D. Schulte, Advisors)

Center for Biotechnology

Colleen Marion. Investigating the signal transduction properties of a novel maize gene using plant transformation and recombination technology. (G. Sarath, Advisor)

Aaron J. Saathoff. Development of an assay for detection and purification of sequence-specific peptidases. (R.E. Bellinger and G. Sarath, Advisors)

Food Science and Technology

Lacey Johannes. Transfer of potentially hazardous peanut proteins during roasting. (S.F. Hefle, Advisor)

April Elizabeth Kester. Application of capillary electrophoresis to the analysis of antioxidants in foods. (M.G. Zeece, Advisor)

School of Natural Resource Sciences

Thomas L. Dredla IV. Water analysis of mosquito breeding habitats and correlation to western equine encephalitis virus. (K.D. Hoagland, Advisor)

Randy Stotler. Pleistocene recharge of Dakota aquifer in northeast Nebraska. (D.C. Gosselin, Advisor)

Veterinary and Biomedical Sciences

Mary Nabity. Determination of the relationship between virulence and cDNA sequence of the fusion protein of bovine respiratory syncytial virus. (C. Kelling, Advisor)

Sara Tebbe. Analysis of the biochemical and morphological changes in the new genetic juvenile cataract husker mouse lens. (M.F. Lou, Advisor)
A

RD faculty involved in plant breeding and genetics research make important contributions to the improvement and development of agricultural and horticultural crops.

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

Germplasm releases provide improved genetic material that is integrated into private and public plant breeding programs. Other releases occur as new cultivars (varieties), which are increased through the Foundation Seed Division and then provided to seed companies for production of certified seed. The following releases were made in 1997.

**Agronomy**

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

**Germplasm Release:** N546

**Scientists:** B. Johnson and S. Rodriguez-Herrera

**Characteristics:** N546, a yellow endosperm maize parental line, originated from a population synthesized from three diverse populations. The line is expected to make contributions to breeding programs for which objectives include breeding for productivity under rain-fed or limited irrigation conditions, and to have utility in maize breeding projects for which breeding objectives include increasing genetic diversity of yellow maize. It is believed N546 carries the brachytic br2 gene. Leaves are dark green, relatively broad, and are semi-erect. N546 is not abnormally short, approximately 72% the height of B73, with ear attachment at mid-plant. Requires two to three fewer days to pollen shed than does B73, with silk emergence beginning approximately two days after pollen shed begins. Ears are girty and enclosed in a relatively tight husk. Grain color is light yellow. Cb color is white. Hybrid progeny of N546 have consistently exhibited good agronomic performance, particularly when evaluated in less productive, non-irrigated environments. Hybrids produced using N546 are best adapted to central and eastern Nebraska, and east into the central Corn Belt. It has not been evaluated for resistance to specific pathogens or insects.

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

**Germplasm Release:** NP39R

**Scientists:** J.D. Eastin, P.T. Nordquist, D.T. Rosenow, C. Woodfin, R.R. Duncan, F.R. Miller, M.W. Witt, and F. Zavala

**Characteristics:** NP39R is a tan, stress resistant sorghum. Population NP39R was derived from a TP24R germplasm base. Traits of value in NP39R are (1) availability of a Great Plains adapted germplasm pool of tan plants with light colored seeds to enhance export marketability for poultry feed, and (2) availability of improved preanthesis stress resistance in sorghum in general and specifically in tan plant germplasm. NP39R has an average height of 109 cm and a mean bloom date range from August 9 to 21. The population is well adapted for selection purposes in the U.S. Great Plains.

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

**Germplasm Release:** NFPM-1

**Scientists:** J.F. Rajewski, D.J. Andrews, S. Appa Rao, J. Pedersen, B. Anderson, B. Stagmeier, G. Cuomo, and G. Burton

**Characteristics:** NFPM-1 has prolific tillering ability in both short-day and long-day environments and produces medium width long leaves and thin to medium stems. Performance tests indicate it is an excellent pollinator parent in combination with non-photoperiod sensitive seed parents for producing high yielding non-flowering forage hybrids in long day length environments. Protein levels are higher than forage sorghum hybrids and are equivalent to that of other pearl millet forages tested. NFPM-1 has not been evaluated for pest or disease resistance. Field observations in eastern Nebraska indicated that NFPM-1 has some tolerance to heavy chinchbug infestations as regrowth begins following a late July forage harvest.
Crop:  
Sudangrass [Sorghum bicolor (L.) Moench]  

Germplasm  
Release:  
A3N242 (A3 GREENLEAF) and A3N243 (A3PIPER) Sudangrass  

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

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

Characteristics:  
These genetic stocks are based on two widely utilized sudangrass cultivars and are the first sudangrasses released in A3 cytoplasm. They have immediate application for research involving sudangrass with A3 cytoplasm and as seed-parent lines for producing Fl sudangrass hybrids. Use of these lines directly or in hybrid combination should 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. They have immediate application for use as testers of combine-height sorghum seed-parent lines for use in commercial production of sorghum x sudangrass hybrids. Reaction of these genetic stocks to specific insects or diseases has not been determined.

Crop:  
Hard Red Winter Wheat [Triticum aestivum (L.) em Theil]  

Variety Name:  
Windstar  

Scientists:  

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

Characteristics:  
‘Windstar’ is an increase of a hard red winter wheat F₁-derived line from the cross TX79A2729/Caldwell/Brule field sel #63/68/Siouxland which was made in 1984 by Dr. J.W. Schmidt. Windstar is an awned, white-glummed cultivar. The canopy is moderately open and upright. The flag leaf is erect and twisted at boot stage. The foliage is blue-green with a waxy bloom at anthesis. The leaf is pubescent. The spike is tapering in shape, moderately long to long, and middense. The glume is short to midlong and narrow to midwide, and the glume shoulder is sloping to square. The beak is moderately short to medium with an acuminate tip. The spike is held erect to inclined at maturity and the glumes and straw have a golden color. Kernels are red colored, hard textured, and ovate. The kernel has no collar, rounded cheeks, midsize germ, midsize brush of medium length, and a narrow and shallow crease. Windstar has moderately strong straw strength. It has exhibited moderate resistance to stem rust and moderate suscepti­bility to leaf rust and wheat streak mosaic virus. It is susceptible to the Russian wheat aphid and the Great Plains biotype of Hessian fly and to soilborne mosaic virus. The recommended growing area for Windstar is the dryland wheat production areas of the Panhandle of Nebraska and western South Dakota. The overall and end-use quality characteristics should be acceptable to the milling and baking industries.

Horticulture  

Crop:  
Winter Squash: Butternut type  
(Cucurbita moschata Duch. Ex Poir)  

Variety:  
Butter Bowl  

Scientists:  
D.P. Coyne, J.M. Reiser, D. Smith, L. Sutton, D. Lindgren, and A.M. Ibrahim  

Characteristics:  
Butterbowl is a novel, small sized, flavorful, early maturing, near-obl ate butternut type winter squash variety. It was derived from a cross of two true breeding crookneck lines. It is suitable for small gardens with limited space due to its compact plant habit. It is resistant to bacterial spot, black fruit rot, and vine borer while it is moderately susceptible to powdery mildew. The fruit cooks uniformly in a microwave oven due to its more uniform flesh thickness.

West Central Research and Extension Center  

Crop:  
Penstemon (Penstemon grandiflorus Nutt.)  

Variety Release:  
‘Prairie Palette’  

Scientists:  
D.T. Lindgren and D.M. Schaaf  

Characteristics:  
A short-lived native plant of the central U.S.A.. This selection is different from the native populations in that it contains a wide range of flower colors not normally found in this species. It is a seed propagated selection intended for uses along highway right-of-ways in prairie plantings.
Copyrights and Patents

Copyright and patent protection is an important parameter in research. It is especially important for discoveries and innovations which have a potential commercial application. Therefore, from time to time, the ARD (and the University) may determine that the public good is best served with regard to technology transfer by entering into an agreement with a public or private institution which provides that institution with proprietary interests in specific research. The research of ARD scientists often can lead to a patent. Most of the patents that have been awarded to ARD scientists have been for equipment developments and specialized processes. These patents often are licensed by private industry, with royalties being reinvested in future ARD research. The following copyright and patents were awarded in 1997.

Agronomy

Copyright Title: WeedSOFT


Description: WeedSOFT is an easy to use decision-aid computer program developed to provide information in pre-emergent, post-emergent or total weed management planning. It is comprised of four separate programs; ADVISOR - a bioeconomic decision model, EnviroFX - groundwater risk assessment, MappVIEW - groundwater vulnerability of counties in Nebraska, and WeedView - weed identification.

Plant Pathology

Patent Title: Hybrid RNA virus

Patent Number: 5,602,242

Scientists: Paul G. Ahlquist (University of Wisconsin-Madison), Roy C. French (United States Department of Agriculture, Agricultural Research Service), and Robert F. Sacher (University of Wisconsin-Madison)

Description: A recombinant RNA virus is provided allowing encapsidation of genetically engineered viral sequences in heterologous protein capsids. This invention allows the size of recombinant virus RNA components to be altered. Methods of making and using such recombinant viruses are also provided, specifically with respect to the transfection of plants to bring about genotypic and phenotypic changes.

Patent Title: Hybrid RNA virus

Patent Number: 5,627,060

Scientists: Paul G. Ahlquist (University of Wisconsin-Madison), Roy C. French (United States Department of Agriculture, Agricultural Research Service), and Robert F. Sacher (University of Wisconsin-Madison)

Description: A recombinant RNA virus is provided allowing encapsidation of genetically engineered viral sequences in heterologous, preferably rod-shaped coat, protein capsids. Since icosahedral viruses are limited in the amount of RNA they can carry, and rod-shaped viruses are expandable, this invention allows the size of recombinant virus RNA components to be increased (or decreased).
Patent Title: Plant tissue comprising a subgenomic promoter
Patent Number: 5,633,447

Scientists: Paul G. Ahlquist (University of Wisconsin-Madison) and Roy C. French (United States Department of Agriculture, Agricultural Research Service)

Description: A subgenomic promoter of a positive strand RNA virus is disclosed which directs the expression of a structural gene. The core region and an upstream activating domain of the subgenomic promoter are identified. This promoter can be utilized in appropriate engineered recombinant DNA derivative which may be chromosomally integrated or maintained as an episome in transformed cells.

Patent Title: Subgenomic promoter
Patent Number: 5,670,353

Scientists: Paul G. Ahlquist (University of Wisconsin-Madison) and Roy C. French (United States Department of Agriculture, Agricultural Research Service)

Description: A subgenomic promoter of a positive strand RNA virus is disclosed that directs the amplified expression of a structural gene in plant tissue. The core region and an upstream activating domain of the subgenomic promoter are identified. This promoter can be utilized in a modified virus to provide regulated expression of foreign genes in plant cells.
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 1998)

**University of Nebraska**

**Board of Regents**

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
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<tbody>
<tr>
<td>Robert M. Allen</td>
<td>Hastings</td>
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<tr>
<td>Don S. Blank</td>
<td>McCook</td>
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<tr>
<td>Chuck Hassebrook</td>
<td>Walthill</td>
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<tr>
<td>Drew Miller</td>
<td>Papillion</td>
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<tr>
<td>Nancy O’Brien</td>
<td>Waterloo</td>
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<tr>
<td>John W. Payne</td>
<td>Kearney</td>
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<tr>
<td>Rosemary Skrupa</td>
<td>Omaha</td>
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<tr>
<td>Charles S. Wilson</td>
<td>Lincoln</td>
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</tbody>
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**Student Regents**

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<tr>
<th>Institution</th>
<th>Name</th>
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<tr>
<td>UNMC</td>
<td>Julie Chase</td>
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<tr>
<td>UNO</td>
<td>Joseph Sanchez</td>
</tr>
<tr>
<td>UNL</td>
<td>Sara Russell</td>
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<tr>
<td>UNK</td>
<td>Jennifer Kruse</td>
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</tbody>
</table>

**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; Vice Chancellor, Extended Education 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
Shripat Kamble, Administrative Intern
Dora Dill, Administrative Technician
Diane Mohrhoff, Project Assistant
Nelvie Lienemann, Staff Secretary III
Mary Jacobs, Temporary/On Call

1Temporary appointment
Organizational Chart

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

Vice Chancellor
Irvin T. Omtvedt

Interim Associate Vice Chancellor
Glen Vollmar

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

Interim Dean International Programs
John Foster

*Director, Nebraska Agricultural Experiment Station
**Director, University of Nebraska Cooperative Extension
Administrative Units Reporting to ARD
Institute of Agriculture and Natural Resources
The University of Nebraska — Lincoln
June 1998

Agricultural/Natural Resources Units

Agricultural Economics
Gary Lynne, Head

Agricultural Leadership, Education and Communication
Earl Russell, Head

Agronomy
Kenneth Cassman, Head

Animal Science
Elton Aberle¹, Head
Roger Mandigo², Interim Head

Biochemistry
Robert Klucas, Head

Biological Systems Engineering
Glenn Hoffman, Head

Biology
Anne Parkhurst, Head

Entomology
Sharron Quisenberry, Head

Food Science and Technology
Steve Taylor, Head

Horticulture
Paul Read¹, Head
David Lewis², Head

Plant Pathology
Anne Vidaver, Head

School of Natural Resource Sciences
Blaine Blad, Director

Veterinary and Biomedical Sciences
Jack Schmitz

Human Resources and Family Sciences

Family and Consumer Sciences
Shirley Baugher, Chair

Nutritional Science and Dietetics
Marilynn Schnepf, Chair

Textiles, Clothing and Design
Rita Kean, Chair

Off-Campus Research Centers

Agricultural Research and Development Center
Ithaca—Daniel Duncan, Director

Northeast Research and Extension Center
Concord—Robert Fritschenn¹, Director
John Witkowskii², Director

Panhandle Research and Extension Center
Scottsbluff—Charles Hibberd, Director

South Central Research and Extension Center
Clay Center—Charles Stonecipher¹, Director
Alan Baquer², Director

Southeast Research and Extension Center
Lincoln—Randy Cantrell, Director

West Central Research and Extension Center
North Platte—Pete Jacoby¹, Director
Gary Hergert², Director

Interdisciplinary Centers

Biotechnology Center
Anne Vidaver, Director

Food Processing Center
Steve Taylor, Director

Center for Grassland Studies
Martin Massengale, Director

Great Plains Regional Center for Global Environmental Change
William Easterling¹, Director
Shashi Verma², Director

Industrial Agricultural Products Center
Milford Hanna, Director

Center for Rural Community Revitalization and Development
Sam Cordes, Director

Center for Sustainable Agricultural Systems
Chuck Francis, Director

Water Center/Environmental Programs
Bob Volk, Director

IANR Communications and Information Technology
Dan Cotton, Director

¹Ended appointment during 1997–1998
²Began appointment during 1997–1998
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
Haskell Agricultural Laboratory — Concord
High Plains Agricultural Laboratory — Sidney
Horning Forestry Farm — Plattsmouth
Northeast Research and Extension Center — Norfolk
Panhandle Research and Extension Center — Scottsbluff
South Central Research and Extension Center, Great Plains Veterinary Educational Center, and the U.S. Meat Animal Research Center (USDA) — Clay Center
Southeast Research and Extension Center — Lincoln
West Central Research and Extension Center — North Platte
Approximately 334 faculty members have research appointments in ARD. Most have joint appointments, with teaching or extension responsibilities as well. Some faculty have responsibilities other than ARD research (rsch), extension (ext) or teaching (tch). Administrative appointments, as well as appointments with centers and other UNL units or with the USDA Agricultural Research Service (other), also are noted here.

The School of Natural Resource Sciences was formed in August 1997. The School was formed from the merger of the Department of Agricultural Meteorology; Department of Forestry, Fisheries and Wildlife and the Water Center/Environmental Programs. In addition, several faculty from other units within the University transferred all or part of their appointment to the School.

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

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

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

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

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

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

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### Agricultural Economics

- **Gary Lynne**: Professor, Rsch: 0.40, Ext: 0.30, Teh: 0.30, Other: 0.00, Head.
- **John C. Allen**: Associate Professor, Rsch: 0.50, Ext: 0.35, Teh: 0.08, Other: 0.07, Rural Sociology.
- **J. David Aiken**: Professor, Rsch: 0.45, Ext: 0.25, Teh: 0.30, Other: 0.15, Agricultural and Natural Resources Law.
- **Azzeddine Azzam**: Professor, Rsch: 0.70, Ext: 0.30, Other: 0.20, Organization of Food Processing.
- **Maurice E. Baker**: Professor, Rsch: 0.20, Ext: 0.80, Other: 0.20, Natural Resource Economics.
- **Dennis Conley**: Professor, Rsch: 0.45, Ext: 0.55, Other: 0.20, Agribusiness.
- **Sam M. Cordes**: Professor, Rsch: 0.40, Ext: 0.60, Other: 0.20, Director, Center for Rural Community Revitalization and Development; Rural Health.
- **Lilyan Fulginiti**: Associate Professor, Rsch: 0.75, Ext: 0.25, Other: 0.20, Agricultural Policies/Production.
- **Glenn A. Helmers**: Professor, Rsch: 0.60, Ext: 0.40, Other: 0.15, Farm Management, Agricultural Finance Policy.
- **Bruce B. Johnson**: Professor, Rsch: 0.45, Ext: 0.55, Other: 0.20, Resource and Community Economics.
- **H. Douglas Jose**: Professor, Rsch: 0.20, Ext: 0.80, Other: 0.20, Farm and Ranch Management, Agricultural Finance Policy.
- **William Miller**: Professor, Rsch: 0.25, Ext: 0.50, Other: 0.15, Natural Resources and Environmental Economics.
- **Richard Perrin**: Professor, Rsch: 0.75, Ext: 0.25, Other: 0.20, Production Economics.
- **E. Wesley F. Peterson**: Professor, Rsch: 0.75, Ext: 0.25, Other: 0.20, International Trade, Development and Policy.
- **George H. Pfeiffer**: Associate Professor, Rsch: 0.25, Ext: 0.75, Other: 0.20, Farm and Ranch Management.
- **Jeffrey S. Royer**: Professor, Rsch: 0.70, Ext: 0.30, Other: 0.20, Agribusiness and Marketing.
- **Raymond J. Supalla**: Professor, Rsch: 0.75, Ext: 0.25, Other: 0.15, Natural Resource Economics.

### Agricultural Leadership, Education and Communication

- **Earl B. Russell**: Professor, Rsch: 0.20, Ext: 0.15, Teh: 0.65, Other: 0.10, Head.
- **John E. Barbuto, Jr.**: Assistant Professor, Rsch: 0.25, Ext: 0.25, Teh: 0.50, Other: 0.15, Leadership Development.
- **O. S. Gilbertson**: Professor, Rsch: 0.25, Ext: 0.15, Teh: 0.60, Other: 0.15, Teacher Education/Leadership Development.
- **James W. King**: Associate Professor, Rsch: 0.25, Ext: 0.15, Teh: 0.75, Other: 0.15, Distance Education.
- **S. Kay Rockwell**: Professor, Rsch: 0.25, Ext: 0.60, Teh: 0.15, Other: 0.10, Program Evaluation/Distance Education.

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1. Ended research appointment during 1997-1998
2. Began research appointment during 1997-1998
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2Began research appointment during 1997-1998
3Began interim head position during 1997-1998
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**Off-Campus Research Centers**

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<th>Extension</th>
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1 Ended research appointment during 1997-1998
2 Began research appointment during 1997-1998
3 Began director position during 1997-1998
### Panhandle Research and Extension Center

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### South Central Research and Extension Center

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Interdisciplinary Activities

Water Center/Environmental Programs

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Agricultural Research Division

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1 Ended research appointment during 1997-1998
2 Began research appointment during 1997-1998
3 Began interim director appointment during 1997-1998
4 Began interim associate director appointment during 1997-1998
The Agricultural Research Division hosted 30 visiting scientists and 53 research associates to the campus in 1997-1998. ARD research is complemented and enhanced by these collaborating scientists—it is through the sharing of knowledge and expertise that the field of science is advanced.

### Visiting Scientists

#### Agronomy

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<th>Visiting Scientist</th>
<th>Country</th>
<th>Expertise/Discipline</th>
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<tr>
<td>Dr. Michele Ariezo</td>
<td>Italy</td>
<td>Remediation of soil and water by advanced oxidation technologies</td>
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<tr>
<td>Anna Gajda</td>
<td>Poland</td>
<td>Soil microbiology</td>
</tr>
<tr>
<td>Dr. Ruidong Huang</td>
<td>China</td>
<td>Sorghum mineral nutrition and environmental stress</td>
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<tr>
<td>Mr. S. A. Ipinge</td>
<td>Namibia</td>
<td>Pearl millet breeding</td>
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<tr>
<td>Mr. Peter Juroszek</td>
<td>Germany</td>
<td>Weed spatial heterogeneity and population processes</td>
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<tr>
<td>Dr. Kedar Nath Rai</td>
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<td>Pearl millet breeding research</td>
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#### Animal Science

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<td>Riccardo Bozzi</td>
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<tr>
<td>Seong-Bok Choi</td>
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<tr>
<td>William Fulton</td>
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<tr>
<td>Shylaja Jagannatha</td>
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<td>Jette Jakobsen</td>
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<td>Agnes Janosa</td>
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<td>Paulo Rorato</td>
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<tr>
<td>Akio Tamai</td>
<td>Japan</td>
<td>Livestock production</td>
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### Entomology

**Visiting Scientist:** Jan Chirico  
**Country:** Sweden  
**Expertise/Discipline:** Veterinary entomology and parasitology

### Plant Pathology

**Visiting Scientist:** Dr. Nazira Aytkhozhina  
**Country:** Kazakhstan  
**Expertise/Discipline:** Microbiology  
**Visiting Scientist:** Dr. Shin-Churl Bae  
**Country:** Korea  
**Expertise/Discipline:** Molecular biology  
**Visiting Scientist:** Dr. Graciela Godoy-Lutz  
**Country:** Dominican Republic  
**Expertise/Discipline:** Plant pathology

### Veterinary and Biomedical Sciences

**Visiting Scientist:** Seung Ki Chon  
**Country:** South Korea  
**Expertise/Discipline:** Virology  
**Visiting Scientist:** David Barcellos  
**Country:** Brazil  
**Expertise/Discipline:** Veterinary medicine  
**Visiting Scientist:** Sonia Estella  
**Country:** Argentina  
**Expertise/Discipline:** Pathology  
**Visiting Scientist:** Leticia Garcia  
**Country:** Mexico  
**Expertise/Discipline:** Bacteriology  
**Visiting Scientist:** Ana Maria Jar  
**Country:** Argentina  
**Expertise/Discipline:** Immunology

### Northeast Research and Extension Center

**Visiting Scientist:** John B. Gaughan  
**Country:** Australia  
**Expertise/Discipline:** Animal production

### Research Associates

#### Agronomy

**Research Associate:** Jongil Chung  
**State/Country:** Nebraska, USA  
**Expertise/Discipline:** PCR-based RAPD marker technology

**Research Associate:** Dennis Francis  
**State/Country:** Nebraska, USA  
**Expertise/Discipline:** Soil and water science

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

**Research Associate:** Kathleen Heuss-Larosa  
**State/Country:** Nebraska, USA  
**Expertise/Discipline:** Analysis of gene expression in transformed plants

**Research Associate:** Fabien Jeutong  
**State/Country:** Nebraska, USA  
**Expertise/Discipline:** Male sterility systems in pearl millet hybrids

**Research Associate:** JaiHeon Lee  
**State/Country:** Nebraska, USA  
**Expertise/Discipline:** Wheat transformations

**Research Associate:** Zhengming Li  
**State/Country:** Nebraska, USA  
**Expertise/Discipline:** Environmental remediation of organo-nitrogen contaminants in soil and water

**Research Associate:** Chris Neerer  
**State/Country:** Guelph, Canada  
**Expertise/Discipline:** Plant patch dynamics to address weed problems in managed agroecosystems.

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

**Research Associate:** Galina Vasilyeva  
**State/Country:** Pennsylvania, USA  
**Expertise/Discipline:** Environmental remediation of organo-nitrogen contaminants in water and soil

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

**Research Associate:** Zhanyuan Zhang  
**State/Country:** Nebraska, USA  
**Expertise/Discipline:** Attempts to improve efficiency of soybean transformation
<table>
<thead>
<tr>
<th><strong>Animal Science</strong></th>
<th><strong>Biological Systems Engineering</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Associate: Nicolas C. Heng</td>
<td>Research Associate: Ersoy Yildirim</td>
</tr>
<tr>
<td>State/Country: New Zealand</td>
<td>State/Country: Nebraska/USA</td>
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<tr>
<td>Expertise/Discipline: Molecular microbiology</td>
<td>Expertise/Discipline: Geographical information systems, irrigation engineering</td>
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<table>
<thead>
<tr>
<th><strong>Biochemistry</strong></th>
<th><strong>Food Science and Technology</strong></th>
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<tbody>
<tr>
<td>Research Associate: Mohammad Anwaruzzaman</td>
<td>Research Associate: Soo-Hyan Chung</td>
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<tr>
<td>State/Country: Bangladesh</td>
<td>State/Country: Korea</td>
</tr>
<tr>
<td>Expertise/Discipline: Biochemistry</td>
<td>Expertise/Discipline: Food mycology/mycotoxins</td>
</tr>
<tr>
<td>Research Associate: Alexander Arendsen</td>
<td>Research Associate: Andrea Fadeev</td>
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<tr>
<td>State/Country: Netherlands</td>
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<tr>
<td>Expertise/Discipline: Protein/chemistry</td>
<td>Expertise/Discipline: Fermentation biochemistry</td>
</tr>
<tr>
<td>Research Associate: Sarbani Chakraborty</td>
<td>Research Associate: Jason Hlywka</td>
</tr>
<tr>
<td>State/Country: India</td>
<td>State/Country: Canada</td>
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<tr>
<td>Expertise/Discipline: Molecular genetics</td>
<td>Expertise/Discipline: Food toxicology/immunology</td>
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<tr>
<td>Research Associate: Shantanu Chowdhury</td>
<td>Research Associate: Jicai Huang</td>
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<tr>
<td>State/Country: India</td>
<td>State/Country: China</td>
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<tr>
<td>Research Associate: Yu-Chung Du</td>
<td>Research Associate: Jack Kelly</td>
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<tr>
<td>State/Country: China</td>
<td>State/Country: Nicaragua</td>
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<td>Expertise/Discipline: Biochemistry</td>
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<tr>
<td>Research Associate: Konstantin Korotkov</td>
<td>Research Associate: Murthy Mangalampalli</td>
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<td>State/Country: Russia</td>
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<td>Expertise/Discipline: Biochemistry</td>
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<tr>
<td>Research Associate: Nilesh Maiti</td>
<td>Research Associate: Celestin Munimbaizi</td>
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<tr>
<td>State/Country: India</td>
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<tr>
<td>Research Associate: Devendra Naidu</td>
<td>Research Associate: Deepak Sahai</td>
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<td>State/Country: India</td>
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<tr>
<td>Expertise/Discipline: Biochemistry</td>
<td>Expertise/Discipline: Cereal chemistry and processing</td>
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<tr>
<td>Research Associate: Kushal Qamungo</td>
<td>Research Associate: Wen Hui Zhang</td>
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### Plant Pathology

<table>
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<tr>
<th>Research Associate</th>
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<tbody>
<tr>
<td>Tony Buhr</td>
<td>Nebraska/USA</td>
<td>Plant molecular biology</td>
</tr>
<tr>
<td>II-Rong Choi</td>
<td>Kentucky/USA</td>
<td>Plant virology</td>
</tr>
<tr>
<td>Mike Graves</td>
<td>Oregon/USA</td>
<td>Molecular virology</td>
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<tr>
<td>Chongxi Huang</td>
<td>China</td>
<td>Molecular biology</td>
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<tr>
<td>Jeff Rollins</td>
<td>Indiana/USA</td>
<td>Fungal molecular genetics</td>
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<tr>
<td>Chidananda Sulli</td>
<td>India</td>
<td>Plant molecular biology</td>
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<tr>
<td>Allen Szalanski</td>
<td>Nebraska/USA</td>
<td>Nematode molecular systematics</td>
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<tr>
<td>Lingyu Zhang</td>
<td>China</td>
<td>Wheat transformation</td>
</tr>
<tr>
<td>Yange Zhang</td>
<td>China</td>
<td>Molecular biology</td>
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</table>

### Veterinary and Biomedical Sciences

<table>
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<tr>
<th>Research Associate</th>
<th>State/Country</th>
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<tbody>
<tr>
<td>Ayub Ali</td>
<td>Japan</td>
<td>Virology</td>
</tr>
<tr>
<td>Emil Berberov</td>
<td>Bulgaria</td>
<td>Microbiology</td>
</tr>
<tr>
<td>Xiaoxing Cheng</td>
<td>China</td>
<td>Microbiology</td>
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<tr>
<td>Sandra Fernandez</td>
<td>Argentina</td>
<td>Microbiology</td>
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<tr>
<td>J.J. Hovde</td>
<td>North Dakota/USA</td>
<td>Large animal veterinary medicine</td>
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<tr>
<td>Yunquan Jiang</td>
<td>China</td>
<td>Biochemistry protein/purification and virology</td>
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<tr>
<td>Nelson Lezcano</td>
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<td>Neurobiology</td>
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<tr>
<td>Daniel Perez</td>
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<td>Chun Qiu</td>
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<td>Cataract/eye disease</td>
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<tr>
<td>Nalini Raghavaehari</td>
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<td>Loren Schultz</td>
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<td>Jung-Hyang Sur</td>
<td>South Korea</td>
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<tr>
<td>Ventzislav Vassilev</td>
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<td>Yange Zhang</td>
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### School of Natural Resource Sciences

<table>
<thead>
<tr>
<th>Research Associate</th>
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<tbody>
<tr>
<td>Zhengming Li</td>
<td>Nebraska/USA</td>
<td>Environmental remediation of organo-nitrogen contaminants in soil and water</td>
</tr>
<tr>
<td>Galina Vassileva</td>
<td>Russia</td>
<td>Environmental remediation of organo-nitrogen contaminants in water and soil</td>
</tr>
</tbody>
</table>
Research Projects

E ach faculty member with an ARD appointment has a federally-approved research project. A number of faculty have multiple projects. There are 394 research projects that were active for all or part of the 1997-1998 fiscal year in agriculture, natural resources and family sciences. Projects are generally three to five years in duration. Faculty also are part of a national network of Agricultural Experiment Station scientists located at Land Grant Universities across the United States. ARD researchers currently are involved with about 51 regional projects in which they conduct cooperative research with scientists at other universities, addressing problems of regional and national importance. They also participate in approximately 65 regional research committees which serve to exchange information and coordinate cooperative research activities among institutions.

Research projects are listed by departments. An asterisk (*) indicates that the project was discontinued in fiscal year 1997-1998.

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>
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<tr>
<td>Regional Research</td>
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<td>State</td>
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<tr>
<td>McIntire-Stennis</td>
<td>Federal Funds</td>
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<td>Special Grant</td>
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<td>Competitive Grant</td>
<td>Federal Funds/USDA</td>
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<tr>
<td>Animal Health</td>
<td>Federal Funds</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 in Nebraska. Research is a collaborative effort with scientists from other land grant institutions and federal agencies.

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

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

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

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

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

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Agricultural/Natural Resources Units

**Agricultural Economics**

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</table>

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

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

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

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

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

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

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

**Impact analyses and decision strategies for agricultural research (R.K. Perrin)**

**Economics, environment, and new agricultural technology (W.L. Miller)**

**Structural changes in the U.S. grains and oilseeds marketing systems in a dynamic and global marketplace (D.M. Conley)**

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

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

**Water conservation, competition and quality in western irrigated agriculture (R.J. Supalla)**
### Agricultural Leadership, Education and Communication

* 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)

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

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

### Agronomy

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

* 12-011 ha Changes in soil properties associated with changes in land use over the past century (D.T. Lewis)

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

* 12-072 rr Introduction, multiplication, evaluation, preservation, cataloguing and utilization of plant germplasm (D. Baltensperger, K.P. Vogel)

* 12-135 rr Soil productivity and erosion (W.L. Powers)

**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)

**12-190** ha Leafy spurge: analysis of genetic variation by cpDNA characterization (D.J. Lee, M.L. Rose)

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

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

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

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

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

**12-199** ha Herbage and livestock production potential from native warm-season grasses (B.E. Anderson, L.E. Moser)

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

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

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

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

**12-207** ha Maize production practice influence on grain and stover yield and quality (S.C. Mason)

**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 (J.A. Francis)

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

**12-217** ha 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)

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

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

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

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

**12-228** ha Increasing fertilizer efficiency for grain crops (D.H. Sander)

**12-233** eg Exploring the interface of qualitative and quantitative genetics (P.S. Baenziger, Y. Yen)

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

**12-236** eg Events, processes and conditions influencing the stability of weed distributions (D.A. Mortensen, L.J. Young, A.R. Martin)

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

**12-240** eg Chromosome-specific libraries for maize genome research (K. Arumuganathan)

**12-241** ha Ecological studies of Nebraska range-land vegetation (J. Stubbenbeck)

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

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

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


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

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

**12-248** eg Measuring crop nitrogen status using on-the-go sensors (D. Francis)


**12-251** st Integration of abiotic treatments with crop, soil and animal production systems to control nitrate loading (D.A. Mortensen, L.J. Young, A.R. Martin)

Biosolids application and soil chemical properties: changes in phosphorus and carbon pools (D. McCallister)  
Characterizing nitrogen mineralization and availability in crop systems to protect water resources (D. H. Sander, D. T. Walters)  
Community structure and functional diversity of soil microbial communities in natural and agroecosystems (R. A. Diehl)  
Soybean breeding and genetic studies (G. E. Graef)  
Stability of soil microbial communities under different agroecosystems (R. A. Diehl)  
Nutrient management for maximizing nutrient use efficiency in sorghum (J. W. Maranville)  
Assessment of genetic variation for end-use quality traits in soybean (D. Lee)  
Resource-efficient management of summer annual dryland cereal crops in Nebraska (S. C. Mason)  
Cropping systems to optimize yield, water and nutrient use efficiency of pearl millet (S. C. Mason)  
The relevance of field-specific weed populations to performance of integrated weed management systems (D. A. Mortensen, J. A. Dieleman, A. R. Martin)  
Why weed patches persist: dynamics of edges and density (D. A. Mortensen, J. A. Dieleman)  
Herbage and livestock production from legume-grass pastures (B. E. Anderson)  
Molecular characterization and manipulation of the wheat genome for crop improvement (K. S. Gill)  
Effective use of carbon and nutrients in manure using site-specific application (R. E. Goughall, J. S. Schepers, C. A. Shapiro, R. B. Ferguson)  
Epiphytology of corn - velvetleaf competition (J. L. Lindquist)  
Management systems for improved decision making and profitability of dairy herds (R. J. Grant, H. D. Jose)  
Biophysical models for poultry production systems (M. M. Beck)  
Utilization of byproducts in grain diets fed to feedlot cattle (T. Milton, T. J. Klopfenstein, T. L. Mader)  
Sustainable beef growing-finishing systems (T. J. Klopfenstein, T. Milton)  
Relationship of subfunctional corpora lutea to frequency of LH pulses during the periovulatory period of cattle (J. E. Kinder)  
Forage protein characterization and utilization for cattle (T. J. Klopfenstein, L. E. Moser)  
Genetic variation for reproduction and energy utilization (M. K. Nielsen)  
Optimizing the utilization of dietary fiber and lipids by dairy cows (R. J. Grant)  
Nutrition of prolific sows (A. J. Lewis, P. S. Miller)  
Copper and zinc in beef cow reproduction (D. R. Brink, R. J. Ruby)  
Molecular mechanisms regulating skeletal muscle growth and differentiation (S. J. Jones)  
Processed and manufactured meat technology (R. W. Mandigo)  
Protein and energy constraints of rapid lean growth (P. S. Miller, A. J. Lewis)  
Regulation of gonadotropin synthesis and secretion and ovarian follicle development pre- and postpartum (J. E. Kinder, R. J. Kittok)  
Evaluation of cow/calf weaning management systems to improve economic efficiency (R. J. Rasy, T. J. Klopfenstein, T. Milton, C. R. Calkins)  
Genetic enhancement of health and survival for dairy cattle (J. E. Kinder)  
Ovarian follicular development in prepubertal heifers: role of LH, FSH and estradiol (J. E. Kinder)  
Factors affecting calcium transport in the avian small intestine and egg shell quality (S. S. Scheideler)  
Nitrogen metabolism in Prevotella ruminicola: a molecular genetics approach (M. Morrison)  
Testicular modulation of luteinizing hormone secretion (R. J. Kittok, J. E. Kinder, H. E. Grotenjan)  
Gastrointestinal structure and function as related to nutrition and body metabolism (E. T. Clemens)  
Estrogen-calcium relationships during onset of metabolic bone disease in laying hens (M. M. Beck)  
Molecular biology of protein degradation and utilization by Prevotella ruminicola (M. Morrison)  
Persistent ovarian follicles: role of progestins and LH in cows (J. E. Kinder)  
Physiological and management aspects of expression of estrus and ovulation rate in swine (D. R. Zimmerman)  
Measurement and manipulation of carcass traits and influencing fresh meat value (C. R. Calkins)  
Transfer of antibiotic resistance genes between bacterioids and Prevotella species (M. Morrison)  
Positional and functional identification of economically important genes in the pig (D. Pomp)  
Physiological and nutritional aspects of improving reproduction in dairy cattle (L. L. Larson)  
Screening the pig genome for QTL controlling reproduction (D. Pomp, R. K. Johnson)  
Development of flow-sorted chromosome specific pools for mapping disease and production genes in pigs (D. Pomp, S. Jones, K. Arumuganathan)  
Molecular and kinetic analyses of the adherence of Ruminococcus albus B to cellulose (M. Morrison, R. Grant)  
Integration of quantitative and molecular technologies for genetic improvement of pigs (R. K. Johnson, D. Pomp)  
Recombinant bovine and equine gonadotropins (H. E. Grotenjan)  
Synthesis and assembly of cellulose binding proteins by Ruminococcus albus (M. Morrison)  
Recombinant bovine gonadotropins (H. E. Grotenjan, J. E. Kinder)  
Molecular biology of protein degradation and utilization by Prevotella ruminicola (M. Morrison)
Biochemistry

15-022  rr  Regulation of photosynthetic processes (R. Choate)
15-040  rr  Regulation of photosynthetic processes (J.P. Markwell)
*15-059  ha  Structure and chemistry of compounds involved in the interactions between wheat and Hessian fly (H. W. Knoche)
*15-062  ha  Mammalian cobalamin-dependent enzymes (R.V. Banerjee)
*15-063  ha  Enzymology of anaerobic CO fixation and bioremediation (S.W. Ragsdale)
15-067  ha  Regulation of photosynthetic processes (R. Spreitzer)
15-069  ha  Chloroplast thylakoid protein phosphatase (J.P. Markwell)
15-070  st  Development of dicamba-tolerant plants (D.P. Weeks, P.L. Herman)
15-071  cg  Genetic modification of chloroplast rubisco (R.J. Spreitzer)
15-072  cg  Enzymes influencing leghemoglobin in legumes (R.V. Khuca, G. Sarath)
15-073  rr  Diversity and interaction of beneficial bacterial and fungi in the rhizosphere (R.V. Khuca)

Biological Systems Engineering

11-001  st  Evaluation of performance of new tractors (L.L. Levittus)
11-044  rr  Improvement of thermal processes for food (M.A. Hanna)
11-079  ha  Agricultural tractor testing board: policies and procedures (L.L. Bashford, M.F. Kocher, R.D. Grisso)
*11-087  ha  Fertilization techniques for furrow-irrigated crops using surge irrigation (D.G. Watts)
11-093  ha  Development and evaluation of sensors and control systems for seed handling and delivery (M.F. Kocher)
11-094  ha  Use of the global positioning system in production agriculture (L.L. Bashford)
11-096  ha  Waste management: disposal site characterization and hazard assessment (W.E. Wehki)
11-097  ha  Protein film production and evaluation (C.L. Welker)
11-098  rr  Integrated systems for improved water and nitrogen management in irrigation environments (D.L. Martin, D.G. Watts, N.L. Klocke)
11-099  ha  Improving field productivity and predicting energy requirements of soil-engaging equipment (R.D. Grisso, M.F. Kocher, L.L. Bashford)
11-101  eg  Program management and planning for advanced materials from renewable resources (L.D. Clements)
11-102  ha  Identification, modeling, and design of plant sensor systems for variable-rate chemical application (G.E. Meyer)
11-103  st  Managing atrazine runoff losses to improve surface water quality (T.G. Franti)
11-105  st  Safe and efficient use of electrical energy for irrigation, livestock, and poultry facilities (L. Stetson)
11-106  st  Whole farm nutrient budgeting for livestock systems (R.K. Koelsch, M.C. Brumm, J.A. Nienaber)
11-107  ha  Bovine rumen contents as a source of industrial enzymes and chemicals (L.D. Clements)
11-108  sg  Using army ammunition plants to process agricultural materials into industrial products (L.D. Clements)
11-109  ha  Whole farm nutrient balance for livestock production systems (R.K. Koelsch)
11-110  st  Variability in metering devices used in site-specific crop management schemes (L.L. Bashford)

Biometry

23-001  st  Applications of statistics to research in agriculture (D.B. Marx, W.W. Stroup, A.M. Parkhurst, K. Eskridge)
23-002  rr  Stress factors of farm animals and their effects on performance (A.M. Parkhurst)
23-003  st  Innovative design and analysis of agricultural experiments (W.W. Stroup, E.T. Papavizas)

Entomology

17-047  rr  Spatial dynamics of leafhopper pests and their management on alfalfa (S.D. Danielson)
17-054  ha  Biochemistry and physiology of lipids, prothoracins and related icosanoids in insects (D.W. Stanley)
*17-056  ha  Determinants of insecticide toxicity in resistant pest and nontarget aquatic insect species (B.D. Siegfried)
*17-057  ha  Genetic factors associated with the development of aphid biotypes and insecticide resistance (Z.B. Mayo)
17-058  ha  Biology, ecology, and management of Diabrotica species (L.J. Meinke)
*17-059  rr  Development of sustainable IPM strategies for soybean arthropod pests (L.G. Higley)
17-060  rr  A national agricultural program to clear pest management agents for minor use (S.T. Kamble)
17-061  st  Management of fly population densities in cattle feedlots to reduce adverse impacts (G.D. Thomas, J.J. Petersen, S.R. Skoda)
17-062  ha  Arthropods associated with buffalograss and other turfgrasses in Nebraska (P.P. Baxendale)
17-063  ha  Stress-cereal crop interactions and development of resistant cultivars (S.S. Quisenberry)
17-064  ha  Host plant resistance, insect genetics, and biological studies of cereal insects (J.E. Foster)
**Horticulture**

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

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

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

20-062 ha Breeding and development of turfgrasses for low resource requiring environments (L. Hodges, J.R. Braadlie)

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

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

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

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

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

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

20-059 ha Factors affecting prairie forage and grass establishment; interference in sustainable landscape management (G.L. Davis)

20-060 ha Irrigation effects on turfgrass disease biological control agents (G.Y. Yuen, G.L. Horst)

**Plant Pathology**

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

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

21-010 ha DNA replication and gene expression of Chlorella viruses (J.L. Van Etten)

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

*21-046 ha Host-pathogen 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. Misra)

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

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

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

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

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

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

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

*21-059 re Gene flow in entomopathogenic nematodes (T.O. Powers)

*21-060 re Irrigation effects on turfgrass disease biological control agents (G.Y. Yuen, G.L. Horst)

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**Food Science and Technology**

16-044 re Molecular mechanisms regulating skeletal muscle growth and differentiation (M.G. Zeece)

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

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

*16-052 ha Role of proteinase inhibitors in protein degradation (M.G. Zeece)

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

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

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**Ecology and management of Diatromiota species (L. Meinke)**

**Molecular mechanisms regulating skeletal muscle growth and differentiation (L.J. Meinke)**

**Technology**

**Development of resistance management techniques for the processing of poultry products (S.L. Taylor)**

**Role of proteinase inhibitors in protein degradation (M.G. Zeece)**

**Mechanisms and management of arthropod injury to plants (L.G. Higley)**

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

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**Food Science and Technology**

16-044 re Molecular mechanisms regulating skeletal muscle growth and differentiation (M.G. Zeece)

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

16-055 ha Food allergies and sensitivities (S.L. Taylor, S.L. Helle)
21-061 ha Detection and properties of plant viruses of Nebraska with emphasis on sugar beet viruses (L.C. Lane)
*21-062 eg Pathogenicity 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 mycotoxins in cereal grains (M.B. Dickman)
21-065 sg Biological control of Sclerotinia sclerotiorum on legumes in the North Central Region (G.Y. Yuen, J.L. Park)
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)
21-069 ha Leaf rust virulence in Nebraska and management systems for turfgrass diseases (J.E. Watkins)
21-070 ha Mitigation of diseases of dry edible bean stem rot of soybean by managed plant resistance (J.R. Steudman)

**School of Natural Resource Sciences**

12-209 ha Procedures for assessing impacts of nonpoint agrichemicals on ground water (R.F. Spalding)
12-230 ha Transport, reactions and fate of organic contaminants in soil (S.D. Comfort)
12-239 ha Processes associated with long-term fate and detoxification of organosulfur contaminants in soil (P.J. Shea)
*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)
*26-016 st Integrated pest management - vertebrates in Nebraska (S.E. Hygnstrom)
*26-017 ha Water quality and water quantity criteria for Nebraska fishes (E.J. Peters)
*26-018 rr Asian spruce in diverted farmland (J.A. Savidge)
*26-019 ha Primary water quality determinants of attached algal communities in Nebraska (K.D. Hoagland)
*26-020 sa Evaluation of environmental factors and fish species for aquaculture development in Nebraska (T.B. Kayes)
*26-021 m Molecular mechanisms associated with cellular homeostasis and differentiation in plants (S.G. Ernst)
*26-022 st Wildlife and sustainable agroecosystems (R.M. Case)
26-023 ms Windbreak shelter effects (J.R. Brandle, L. Hodges)
26-025 m Biological and tree-injection methods for controlling tree pests (M.O. Harrell)
26-026 m Factors affecting wildlife diversity and the distribution of rare populations in Nebraska (J.A. Savidge)
26-027 st Integrating biological diversity into managed land-use systems (R.J. Johnson)
27-003 ha Exchange of carbon dioxide and other atmospheric trace gases in vegetated ecosystems (S.B. Verma)
27-004 ha Remotely sensed estimates of productivity, energy exchange processes and water stress in vegetation (B.L. Blad, E.A. Walter-Shea)
27-007 st Drought: response and policy implications (D.A. Wilhite)
27-008 rr Climate and agricultural landscape productivity analysis and assessment in the North Central Region (K.G. Hubbard)
27-011 ha Relationships between remotely-sensed spectral properties of vegetated surfaces and biophysical properties (E.A. Walter-Shea)
27-012 rr NADP: a long-term monitoring program in support of research on the effects of atmospheric chemical deposition (S.B. Verma)
27-015 sg Developing drought mitigation and preparedness technologies in the U.S. (D.A. Wilhite)
27-016 sa Climate change and the winter wheat agroecosystem: experiments and modeling (A. Weiss)
27-017 ha Remodeling the surface energy budgets with a universal crop coefficient and natural variability specifications (K.G. Hubbard)
*30-002 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)
30-004 st Development of a biochemical approach to manage German cockroaches (S.T. Kamble, G. Sarathi, G. Yuen, L. Young)
40-001 sg Developing drought mitigation and preparedness technologies for the U.S. (D.A. Wilhite)

**Veterinary and Biomedical Sciences**

14-009 rr Prevention and control of enteric diseases of swine (R.A. Mooey)
14-014 rr Bovine respiratory disease (S. Srikumaran)
14-014 st Research laboratory and animal care facility (J.A. Schmaltz, A.R. Doster, J.L. Johnson, D.M. Grotekenschen)
14-039 st Veterinary diagnostic lab system: diagnostic surveillance and disease investigation in Nebraska livestock and poultry (J.A. Schmaltz, A.R. Doster, J.L. Johnson, D.M. Grotekenschen)
14-039 st Veterinary diagnostic lab system: functional analysis of the BHV-1 latency related gene (C. Jones)
14-072 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. Duhame)
14-081 eg Analysis of the bovine herpes virus 1 latency related gene (C. 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. Osorio)
14-086 eg Molecular characterization of Pasteurella multocida 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)
14-089 eg Role of group A bovine P protein in induction of heterotypic immunity (G.E. Duhame)
14-090 st Development of a mycobacterial marker vaccine (R. Barletta, R. Mooey)
14-091 eg Molecular characterization of MHC class I down-regulation by bovine herpesvirus 1 (S. Srikumaran)
14-092 eg The biology of persistent infections caused by bovine reproductive and respiratory virus (F.A. Osorio, A.R. Doster)
14-093 ah Bovine respiratory syncytial virus-glycoprotein interactions in a homologous host cell receptor (C. Kelling)
14-094 ah Molecular characterization of animal RNA viruses and their interactions with the host (R.O. Donis)
14-095 ah Interaction of porcine reproductive and respiratory syndrome virus and Salmonella cholerenteriae (R. W. Wills, F. A. Ooster)

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

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

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

14-099 cg Cis-acting elements in the replication of the bovine viral diarrhea virus genome (R. O. Denis)

**Human Resources and Family Sciences Departments**

**Family and Consumer Sciences**

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

*92-019 sg Housing affordability in rural areas (K. Prorhaska-Cure, 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. Zece)

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

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

92-024 ha Development of a protocol for assessment and intervention of domestic violence and abuse (B. L. Jory)

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

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

*92-027 ha Mental illness and families: a rural perspective (C. W. Smith)

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

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

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

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

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

**Nutritional Science and Dietetics**

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

91-037 ha The use of natural antioxidants to control warmed-over flavor in meats (M. Schipf)

91-038 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 foodservice industry (F. Hammon)

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

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

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

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

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

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

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

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

**Textiles, Clothing and Design**

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

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

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

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

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

**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. Brunn)

42-012 ha Management practices to enhance performance of weaned pigs (M. C. Brunn, D. P. Shelton)

42-013 ha Determination of crop residue cover using electronic image analysis (D. P. Shelton)

42-014 ha Increasing fertilizer use efficiency in northeast Nebraska (C. A. Shapir)

42-015 ha Effects of preplant tillage and nitrogen application method on nitrate leaching (W. L. Kranz)

42-016 ha Development of integrated pest management techniques for improved weed management (D. L. Holkhaus)

**Panhandle Research and Extension Center**

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

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

44-035 ha Feed resources and beef production systems in western Nebraska to optimize total efficiency (L. 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 in the Nebraska Panhandle (G. L. Hein)

*44-044 ha Sugarbeet planters — plant spacing and emergence performance (J. A. Smith, C. D. Yonts, S. D. Kaufman)

*44-045 ha Resource efficient dryland cropping systems for western Nebraska (D. J. Lyon)
44-016 ha Nutrient management of irrigated and dryland crops in western Nebraska (J.M. Blumenfeld)

*44-017 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 seedbed preparation technology for improved sugar beet emergence (J.A. Smith, R.G. Wilson)

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

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

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

44-053 ha Machinery systems management for sugarbeets, dry edible beans, and chickory (J.A. Smith, R.G. Wilson)

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

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

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

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

South Central Research and Extension Center

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

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

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

*48-021 sg Factors inﬂuencing spatial yield and N use efﬁciency of ﬂow-irrigated corn (R.B. Ferguson, G.W. Hergert)

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

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

*48-024 eg Epidemiology and life history of Chlorella africana in the Great Plains (J.P. Stuck)

48-025 ha Subsurface drip irrigation: integrated water and nitrogen BMPs for corn and assessing irrigation uniformity in situ (B.L. Benham)

West Central Research and Extension Center

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

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

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

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

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

43-055 ha Weed control management in reduced tillage systems (G.A. Wicks)

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

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

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

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

43-060 rr Management of arthropod pests of livestock and poultry (J.B. Campbell, G.D. Thomas)

43-061 ha Management practices to improve reproduction of beef heifers (G.H. Deutscher)

43-062 ha Genotype by environment interactions for sow productivity and early piglet growth (T.E. Long)

43-063 ha Grazing management strategies and systems for Sandhills meadows (J.D. Voilesky)

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. Messenga)

Center for Sustainable Agricultural Systems

31-002 st Center for sustainable agricultural systems (C.A. Francis)

31-003 eg 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. Klopheston, J. Brandle)

Food Processing Center

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

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

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

19-007 sg Development and quality/safety enhancement of specialty food products (S.L. Taylor)

Industrial Agricultural Products Center

29-007 sg Industrial agricultural products center (M.A. Hanna)
Publications

While serving the needs of Nebraska’s agricultural producers, agribusinesses, industries, communities and citizens, the ARD places a high priority on being accountable for its resources and documenting impacts of its programs. As in all research institutions, ARD scientists are charged to actively disseminate results of research in scientific journals and technical publications. The division sets optimistic, but reachable, annual goals for scientific publication, theses and dissertations, and other measures of research output. In each of the last three years the goals have been exceeded.

Publications in refereed (peer reviewed) scientific journals represent professional acknowledgment of the value of a research finding to the discipline. ARD scientists have published in a number of different scientific journals during 1997. Faculty also have written books, edited books or contributed chapters for books.

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

Publications in refereed journals, books, book chapters, refereed proceedings, theses and dissertations are listed for calendar year 1997.

Journals in which faculty have published in 1997

Agricultural Economics

Agribusiness Journal
American Journal of Alternative Agriculture
Choices
Journal of Agricultural and Resource Economics
Journal of Cooperatives
Journal of Industrial Economics
Journal of Economic Entomology

Agronomy

Agronomy Journal
American Journal of Alternative Agriculture
Applied Engineering in Agriculture
Bulletin of Environmental Contamination Toxicology
Bulletin of the American Penstemon Society
Canadian Journal of Microbiology
Cereal Chemistry
Crop Science
Environmental Engineering Science
Environmental Pollution

Foods and Biotechnology
Genome
HortScience
International Turfgrass Society Research Journal
Journal of the American Water Resources Association
Journal of Dairy Science
Journal of Environmental Quality
Journal of Environmental Radioactivity
Journal of Experimental Botany
Journal of Geophysical Research
Journal of Plant Nutrition
Journal of Production Agriculture
Journal of Range Management
Journal of Soil and Water Conservation
Journal of Sustainable Agriculture
Maydica
Natural Areas Journal
Plant Cell, Tissue and Organ Culture
Plant Molecular Biology Reporter
Plant Physiology
Science of the Total Environment
Society and Natural Resources
Soil Biology and Biochemistry
Soil Science
Terra
Transactions of the American Society of Agricultural Engineers
Weed Science
Weed Technology
Animal Science

Applied and Environmental Microbiology
Brazilian Journal of Genetics
FEMS Microbiology Letters
Food and Chemical Toxicology
Genetical Research
Journal of Dairy Science
Journal of Animal Science
Journal of Applied Poultry Research
Journal of Muscle Foods
Journal of Range Management
Journal of Soil and Water Conservation
Journal of Thermal Biology
Livestock Production Science
Mammalian Genome
Poultry Science
Theriogenology
Tissue and Cell
Transactions of the American Society of Agricultural Engineers

Biochemistry

Applied and Environmental Microbiology
Archives of Biochemistry and Biophysics
Australian Journal of Plant Physiology
Biochemistry
Bioelectromagnetics
Brazilian Journal of Plant Physiology
British Journal of Medicine
Chemistry and Biology
FEBS Letters
Journal of the American Chemical Society
Journal of Biological Chemistry
Journal of Molecular Biology
Methods of Enzymology
Molecular Biology of the Cell
Plant Physiology

Biological Systems Engineering

Applied Engineering in Agriculture
Cereal Chemistry
Ground Water
Industrial Crops and Products
Journal of Agriculture and Food Chemistry
Journal of Animal Science
Journal of Contaminant Hydrology
Journal of Environmental Quality

Biometry

Cereal Chemistry
Foods and Biotechnology
HortScience
Journal of Agricultural, Biological and Environmental Statistics
Journal of American Society for Horticulture Science
Journal of Food Quality
Journal of Food Science
Journal of Production Agriculture
Journal of Range Management
Journal of Soil Science Society America
Journal of Soil and Water Conservation
Journal of Thermal Biology
Livestock Production Science
Transactions of the American Society of Agricultural Engineers
Weed Technology

Entomology

Agronomy Journal
American Zoology
Annals Entomological Society of America
Apidologie
Archives of Insect Biochemistry and Physiology
Bulletin of Environmental Contamination and Toxicology
Comparative Biochemistry and Physiology
Environmental Entomology
Environmental Toxicology and Chemistry
Insect Biochemistry and Molecular Biology
International Turfgrass Society Research Journal
Journal of Economic Entomology
Journal of Environmental Sciences
Journal of Forestry
Journal of Insect Physiology
Journal of Kansas Entomology
Journal of Production Agriculture
Journal of Sustainable Agriculture
Pesticide Biochemistry and Physiology
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<td>Journal of Applied Poultry Research</td>
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<td>Journal of Chromatography</td>
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Human Resources and Family Sciences

Family and Consumer Sciences

Early Child Development and Care
Journal of Family and Consumer Sciences
Great Plains Research
Journal of Family Psychotherapy
Rural Sociology

Nutritional Science and Dietetics

International Journal of Vitamin and Nutrition Research
Journal of Animal Science
Journal of Food Quality
Journal of Nutrition Education

Textiles, Clothing and Design

Clothing and Textiles Research Journal
Journal of Family and Consumer Sciences
Journal of Small Business and Entrepreneurship
Journal of Small Business Management
Psychology & Marketing

Off-Campus Research Centers

Northeast Research and Extension Center

Journal of Kansas Entomology
Journal of Animal Science
Journal of Soil and Water Conservation
Swine Health and Production

Panhandle Research and Extension Center

Crop Science
Journal of Economic Entomology
Journal of Production Agriculture
Journal of Range Management
Journal of Sugar Beet Research
Journal of Veterinary Diagnostic Investigation
Plant Disease
Soil Science
Weed Technology

South Central Research and Extension Center

Bulletin of Environmental Contamination and Toxicology
Environmental Entomology
Journal of Agricultural and Resource Economics
Journal of Production Agriculture
Journal of Sustainable Agriculture
Seed Technology
Transactions of the American Society of Agricultural Engineers

West Central Research and Extension Center

Journal of Animal Science
Journal of Economic Entomology
Journal of Production Agriculture
Journal of Range Management
Journal of Veterinary Diagnostic Investigation
Weed Science
Weed Technology
Research Publications (1997)

Agricultural/Natural Resources Units

Agricultural Economics

Journal Articles


Book Chapters


Ph.D. Dissertations


M.S. Thesis


Ph.D. Dissertations


coalization of cell division in root-tips of seven major cereal species for high yields of metaphase 
(J. Series No. 11880)

Evaluation of 41 elite and exotic inbred sorghum genotypes for high quality 
(J. Series No. 11356)

Long-term tillage and crop rotation effects on residual nitrate in the crop 
root zone and nitrate accumulation in the intermediate vadose zone. 
Transactions of the American Society of Agricultural Engineers 40:1321-1327. 
(J. Series No. 11622)

(J. Series No. 11280)

Root tip cell cycle synchronization and metaphase chromosomes isolation suitable for flow sorting in 
(J. Series No. 11702)

Destruction of 2,4,6-trinitrotoluene (TNT) by Fenton oxidation. Journal of Environmental Quality 
26:488-497. (J. Series No. 11001)

Remediating TNT-contaminated soil by soil washing and Fenton 
(J. Series No. 11824)

Fenton oxidation of 2,4,6-trinitrotoluene in contaminated soil 
(J. Series No. 11606)

Evidences for homologous linkage groups in the soybean. Crop Science 37:254-257. 
(J. Series No. 10195)

Effects of artificial recharge on ground water quality and aquifer 
(J. Series No. 11414)

Derivatization of 2,4,6-trinitrotoluene (TNT) by Pseudomonas aeruginosa. 
Canadian Journal of Microbiology 43:447-455. (J. Series No. 11486)

Soil temperature and fumigation effects on plant phosphorus uptake 
and related microbial properties. Journal of Plant Nutrition 20:485- 
497. (J. Series No. 11179)

Relationships between in situ protein degradability and grass 
(J. Series No. 11754)

Forage yield, quality, and fertility of sorghum x sudan grass hybrids in 
(J. Series No. 11756)

Registration of 29 forage sorghum 
(19) 
Fertility of sorghum x sudan grass hybrids in 
(J. Series No. 11756)

Remediating TNT-contaminated soil by soil washing and Fenton 
(J. Series No. 11824)

Registration of 29 forage sorghum 
(19) 
Fertility of sorghum x sudan grass hybrids in 
(J. Series No. 11756)

Registration of 29 forage sorghum 
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Registration of 29 forage sorghum 
(19) 
Fertility of sorghum x sudan grass hybrids in 
(J. Series No. 11756)


Book Chapters


Refereed Proceedings


M.S. Theses

Atak, M. 1997. Photoperiod, vernalization, and seedling rate effects on anthesis date and agronomic performance of winter wheat. (Triticum aestivum L.) (P.S. Barmaziger, Advisor)


Callan, A.P. 1998. Grazing date by stocking rate effects on prairie sandreed. (P.E. Reece and W.H. Schacht, Advisors)

Crayman, M. 1997. Inheritance of a putative source of resistance to wheat streak mosaic virus and determination of virus development in different temperatures by symptomology and ELSA. (P.S. Barmaziger, Advisor)

Kityo, M. 1997. Unsaturated hydraulic conductivity of sand by one step outflow for water and carbon tetrachloride. (J.M. Skopp, Advisor)

Koopman, R.L. 1997. Response of plant and seed characteristics of six elite maize inbreds to nitrogen fertilizers. (R.E. Johnson and W.W. Wilhelm, Advisors)


Li, M. 1997. Anatomical, morphological characteristics of maize genotypes varying in resistance to laricinisnap. (B.E. Johnson and W.W. Wilhelm, Advisors)


Watson, A.D. 1997. Developmental morphology and stand establishment of warm-season perennial grass seedlings as affected by preemergence herbicides. (L.E. Moser, Advisor)


Ph.D. Dissertations


Espitia-Romig, E. 1997. The IAL, HRS translocation in the hard red winter wheat Necota. (P.S. Barmaziger, Advisor)


Vidal-Martínez, V. 1997. Pollen production in relation to genotypic and environmental influences in maize. (M.D. Clegg and B.E. Johnson, Advisors)

Yang, L. 1997. The effects of environmental and physiological variables on the gas exchange of forest trees under boreal field conditions. (T.J. Arckbuchar, Advisor)

Animal Science

Journal Articles


Book


M.S. Theses


Ph.D. Dissertation


Biological Systems Engineering

Journal Articles


M.S. Theses

Burr, M.S. 1995. Development and evaluation of a prototype material heating system. (D.D. Jones and M.F. Kocher, Advisors)


Journal Articles

Hanson, D.E. 1997.
Design and introduction of an appropriate technology surface water handpump. (L.D. Clements, Advisor)

A mathematical model and numerical solution algorithm for the simulation of dust-air degradations. (D.D. Jones, Advisor)

Seed spacing performance for general purpose and specialty type sugarbeet planters. (M.F. Kocher, Advisor)

Ph.D. Dissertations

Feedback controlled surge irrigation strategies. (D.E. Eisenhauer, Advisor)

Flavor retention enhancement in extrudates by internal application techniques. (M.A. Hanna, Advisor)

Biometry

Journal Articles


Temperature humidity index for growing tom turkeys. Transactions of the American Society of Agricultural Engineers 49:203-209. (J. Series No. 11504)

Optimization of sulfur dioxide and lactic acid and steeping conditions for wet-milling of grain sorghum. Transactions of the American Society of Agricultural Engineers 40:1643-1648. (J. Series No. 11673)

Factors affecting asparagus sensory evaluation. Journal of Food Quality 20:127-144. (J. Series No. 11218)

Evaluation of corn hybrids using the probability of outperforming a check based on imbalanced data. Journal of Agricultural, Biological and Environmental Statistics 2:245-254. (J. Series No. 11432)

A generalized linear model approach to spatial data analysis and prediction. Journal of Agricultural, Biological and Environmental Statistics 2:157-176. (J. Series No. 11276)

The effect of altering nitrogen and sulfur supply on the growth of cut chrysanthemums. Journal of the American Society for Horticultural Science 122:559-564. (J. Series No. 11352)

Volatile retention in starch extrudates as influenced by storage temperature. Journal of Food Science 65:985-989, 1679. (J. Series No. 11715)

Range or meadow growth and weaning effects on 2-year-old cows. Journal of Range Management 50:16-19. (J. Series No. 11254)

Acute high environmental temperature and calcium-argon relationships in the hen. Poultry Science 75:1553-1562. (J. Series No. 11380)

Quality as a factor in the optimal choice of fertilization and harvest date of meadow hay. Journal of Production Agriculture 10:554-557. (J. Series No. 11651)

The relationship of Asian raw noodle (Streptomyces) color with wheat and flour quality characteristics. Foods and Biotechnology 6:12-19. (J. Series No. 11754)

Variation in polyphenol oxidase activity and quality characteristics among hard white wheat and hard red wheat samples. Cereal Chemistry 74:7-11. (J. Series No. 11511)

Evaluation of Korean raw noodle (Streptomyces) color and cooking properties among hard red winter and hard white wheat samples. Foods and Biotechnology 6:20-25. (J. Series No. 11647)

Spatial series analysis of horizontal cores to characterize tracer patterns in soil profiles. Soil Science 61:1018-1023. (J. Series No. 11446)

Season and genotype influence golf ball roll distance on creeping bentgrass. HortScience 32:878-879. (J. Series No. 11093)

Cattle grazing influences on corn residue cover. Journal of Soil and Water Conservation 52:203-206. (J. Series No. 11104)

Press mill (Panicum miliaceum) response to CA-152005, Metasulfuron, and Trisulfuron. Weed Science 11:138-143. (J. Series No. 11487)


Book Chapters


Entomology

Journal Articles

Parasitoids recovered from European corn borer, Ostrinia nubilalis (Lepidoptera: Pyralidae), larvae in Nebraska. Journal of Kansas Entomology 70:359-361. (J. Series No. 12002)

Bipararian refugia in agroecosystem systems. Journal of Forestry 95:38-41. (J. Series No. 11636)

Insect pests and anthropod predators associated with tree-turf landscapes. Journal of Environmental Sciences 32:257-271. (J. Series No. 11545)

Effects of shelterbelts on the aerial distribution of insect pests in mukankes. Journal of Sustainable Agriculture 9:5-24. (J. Series No. 11282)

Toxicity of seven monoterpenoids to trechadial mites (Acaris: Tarseneminae) and their honey bee (Hymenoptera: Apidae) hosts when applied as fumigants. Journal of Economic Entomology 90:1087-1091. (J. Series No. 11717)

Ellis, M.D., B.D. Siegfried, and B. Swain. 1997.


Book


Book Chapters


Refereed Proceeding


M.S. Theses


Akkuzu, E. 1997. Impacts of wooded riparian edges and cultural practices on arthropod abundance in agricultural systems. (M.E. Dix and J.E. Foster, Advisors)

Clark, T.L. 1997. Parasitoid rates in European corn borer larval, Ostrinia nubilalis (Hubner), recovered from six maize hybrids, Zea mays L. (J.E. Foster and J.F. Witkowski, Advisors)

Food Science and Technology

Journal Articles


Ph.D. Dissertations


Gouveia-Marcon, P. 1997. Baseline susceptibility to Bacillus thuringiensis and genetic studies of the European corn borer Ostrinia nubilalis (Hubner) (Lepidoptera: Pyralidae). (B. D. Siegfried, Advisor)

Heng Moss, T.M. 1997. An investigation on the beneficial arthropods associated with buffalograss and the influence of Rhodina nigracranata (Ashmead) on buffalograss mealybug populations. (F. P. Hazenlade and T. P. Riordan, Advisors)


**Book Chapters**


**M.S. Theses**


**Ph.D. Dissertations**


Boothe, T. 1997. Characterization and analysis of the ATPase from *Streptococcus thermophilus*. (R. Hultink, Advisor)

Christensen, D.P. 1997. Characterization and analysis of the pufD and pufE genes coding for HPr and enzyme 1 of the Listeria monocytogenes phosphotransferase system. (R. Hultink, Advisor)


**Horticulture**

**Journal Articles**


Inheritance of seed weight in two Nebraska synthetic balfourgrass populations. International Turfgrass Society Research Journal 8:367-376. (J. Series No. 11962)


M.S. Theses

In vitro direct shoot organogenesis and plant regeneration from leaves and axillary buds of grapevine (Vitis spp.). (P.E. Read, Advisor)

An investigation on the beneficial arthropods associated with balfourgrass and the influence of Rhagoletis nigricornutus (Ashmead) on balfourgrass maybug populations. (P.P. Basenbale and T.P. Risordan, Advisors)

Nitrogen and sulfur interaction in the production and post harvest performance of pot chrysanthemums grown in a soilless medium. (E.T. Paparozi, Advisor)

Ph.D. Dissertations

Quality of stored strawberry puree produced in an oxygen-reduced environment. (D. Smith, Advisor)

Hruskoj, J.D. 1997.
Implement reorganization plans for the Department of Horticulture Plant Tissue Culture/Biotechnology facilities and program. (P.E. Read, Advisor)

Molecular markers for disease resistance and other traits in intraspecific bean species crosses. (D.P. Coyne Advisor)

Plant Pathology

Journal Articles

Registration of ‘Prairiong’ wheat. (J. Series No. 11520)

Gene expression analysis during conidial germ tube and appressorium development of Colletotrichum trifolii. Applied Environmental Microbiology 63:2378-2383. (J. Series No. 11712)


Hyalohummus synthesis of Chlorovirus Phase I. Science 278:1800-1803. (J. Series No. 11993)


Characteristics of beet sulfotene mosaic virus, a furo-like virus infecting sugar beet. Plant Disease 81:1070-1076. (J. Series No. 11662)

Pence, M.D. 1997.
RAPD molecular markers for the genes controlling seedling lethality and plant crippling in common beans. (D.P. Coyne, Advisor)

Asymbiotic in vitro seed germination, micropropagation and scanning electron microscopy of several temperate terrestrial orchids (Orchidaceae). (P.E. Read, Advisor)


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

Transgenic tobacco plants expressing the bacterial rcm90 gene resistant to tobacco infection. Molecular Breeding 3:391-399. (J. Series No. 10757)

Analysis of 74 kb of DNA located at the right end of the 330-kb Chlorovirus Phase I genome. Virology 237:360-377. (J. Series No. 11501)


The internal transcribed spacer region as a taxonomic marker for nematodes. Journal of Nematology 29:441-450. (J. Series No. 11928)

Chlorovirus Phase I encodes at least six DNA methyltransferases. Gene 190:237-244. (J. Series No. 11667)

Identification of cyst nematodes of agronomic and regulatory concern by PCR-RFLP at ITS1, Journal of Nematology 29:253-264. (J. Series No. 11846)

Isolation of pathogen-stress-inducible cDNAs from alfalfa by mRNA differential display. Plant Molecular Biology 33:737-743. (J. Series No. 11514)

Regulation of aCAMP and aCAMP dependent protein kinase during conidial germination and appressorium formation in Colletotrichum trifolii. Physiological Molecular Plant Pathology 50:117-127. (J. Series No. 11604)


Book Chapter


M.S. Thesis

Comparative analysis of three promoters in tobacco calli. (A. Mitra, Advisor)

Ph.D. Dissertations

Probing host-viral and viral-viral protein interactions in two plant viruses using a yeast two hybrid system. (R.C. French, Advisor)

Genetic variability and mapping of genes controlling resistance to High Plains virus (HPV) in maize. (S.G. Jensen and S.M. Kaeppler, Advisors)

School of Natural Resource Sciences

Journal Articles


Walleye prey selection in Lake McConaughy, Nebraska: a comparison between stomach content analysis and feeding experiments. Journal of Freshwater Ecology 12:511-520. (J. Series No. 11675)


Book Chapter


M.S. Theses


Ritter, M.W. 1997. Wetland habitat characteristics and wetland use by Mariana common moorhen on Guam. (J.A. Savidge, Advisor)

Ph.D. Dissertations


Veterinary and Biomedical Sciences

Journal Articles


**M.S. Theses**

- Bevaid, L.K. 1997. Lung lesions in feedlot aged beef calves at slaughter: an observational study to develop methodologies for recording lung lesions at slaughter and investigating their associations with production. (D. Griffin, Advisor)

- Gottipati, S. 1997. Host cellular protein(s) interacting with the glycoprotein of bovine herpesvirus-1. (S. Srikumaran, Advisor)


- Wanggaard, S. 1997. The voice of the consumer: A qualitative study of a program to reduce adolescent risk behaviors using focus groups and interviews. (W.H. Meredith, Advisor)


**Book Chapters**


**Human Resources and Family Sciences Departments**

**Family and Consumer Sciences**

**Journal Articles**


- M.S. Theses


- Batterson, D. 1997. Forgiveness as a factor in marriage and in conflict resolution following an extramarital affair. (C.R. Smith, Advisor)


**Book Chapters**


- M.S. Theses

Textiles, Clothing and Design

**Journal Articles**


Marketing 11:637-661. (J. Series No. 11558)


Ph.D. Dissertations

Rasmussen, M.W. 1997. Lakota women's traditional dress in the last half of the twentieth century. (P.C. Crews, Advisor)


**Refereed Proceedings**


M.S. Theses


Zhou, Y. 1997. The effects of ultraviolet absorbers and repeated home launderings on ultraviolet radiation transmission through fabrics. (P.C. Crews, Advisor)

Ph.D. Dissertations

Rasmussen, M.W. 1997. Lakota women’s traditional dress in the last half of the twentieth century. (P.C. Crews, Advisor)


M.S. Thesis


Off-Campus Research Centers

Northeast Research and Extension Center

Journal Articles


Book Chapters


Cullen, A.P. 1998. Grazing date by stocking rate effects on prairie sandreed. (P. E. Reche and K.H. Schacht, Advisors)

Ph.D. Dissertations


South Central Research and Extension Center

Journal Articles


Referred Proceedings


M.S. Thesis


Book Chapters


West Central Research and Extension Center

Journal Articles


Book Chapters


Research Bulletin


M.S. Theses

Downs, D. 1997. Diet composition of sandhills winter range and compensatory growth of yearling steers during summer grazing. (T.J. Klopfenstein and D.C. Adams, Advisors)

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

Ph.D. Dissertation

Lardy, G.P. 1997. Protein supplementation of calves and cows grazing sandhills range and subirrigated meadows. (D.C. Adams and T.J. Klopfenstein, Advisors)

Referred Proceedings


Research Expenditures

ARD receives funding from federal formula funds, industry grants, federal grants and state appropriations. During fiscal year 1997-1998, faculty with ARD appointments obtained grant and contract funds that totaled $21,836,373. This amount represents 45.3 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, 1997 through June 30, 1998

Federal Formula Funds:

- Hatch Formula ............... $2,155,406
- Regional Research ........... $ 913,083
- McIntire-Stennis ............ $ 93,168
- Animal Health ............... $ 145,817

Total Federal Formula Funds .................. $ 3,307,474

State Appropriated Funds ...................... $26,275,045

Contracts and Grants:

- USDA Cooperative Agreements ..... $1,996,410
- USDA Special and Competitive Grants $2,487,336
- Federal Grants -
  (NSF, NIH, USEPA, AID, DOE) ...... $4,432,623
- Industry Grants .................... $6,431,460

Total Grants and Contracts ..................... $15,347,460

Product Sales ........................................ $ 7,603,055

Total Expenditures ............................. $52,533,403

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1Includes $1,369,910 of Nebraska Research Initiative funds expended by ARD affiliated units.

2$294,103 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 1998

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### Agricultural Research Division

**Selected Research Program Information**

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<td>26</td>
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<td>11</td>
</tr>
<tr>
<td>New projects</td>
<td>57</td>
<td>47</td>
<td>38</td>
</tr>
<tr>
<td>Projects at the end of the year</td>
<td>384</td>
<td>387</td>
<td>368</td>
</tr>
<tr>
<td><strong>Faculty full-time equivalents (FTE)</strong></td>
<td>128.4</td>
<td>126.3</td>
<td>130.8</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>$230,157</td>
<td>$242,581</td>
<td>$239,650</td>
</tr>
<tr>
<td>Grant and contracts/FTE</td>
<td>$119,739</td>
<td>$126,158</td>
<td>$116,030</td>
</tr>
<tr>
<td>Product sales/FTE</td>
<td>$47,236</td>
<td>$51,824</td>
<td>$58,127</td>
</tr>
<tr>
<td><strong>Outputs from research programs$^2$:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refereed journal articles</td>
<td>312</td>
<td>280</td>
<td>289</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>49</td>
<td>54</td>
<td>49</td>
</tr>
<tr>
<td>M.S. and Ph.D. theses</td>
<td>132</td>
<td>139</td>
<td>136</td>
</tr>
<tr>
<td>Cultivars and germplasm released</td>
<td>19</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Patents obtained</td>
<td>4</td>
<td>5</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.
The scientist is a lover of truth for the very love of truth itself, wherever it may lead.

Luther Burbank
U.S. naturalist and plant breeder