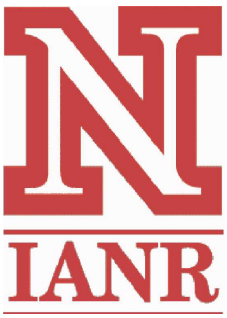
PLAN OF WORK REPORT OF ACCOMPLISHMENT



University of Nebraska Agricultural Research Division
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln

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Federal Fiscal Years
2000 to 2004

2001 Annual Report
PLAN OF WORK
University of Nebraska Agricultural Research Division

INTRODUCTION

A. **PROGRAMS** (5 FEDERAL GOAL AREAS)

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Annual Report
University of Nebraska
Agricultural Research Division

I. INTRODUCTION:

The University of Nebraska Agricultural Research Division is a division of the University of Nebraska Institute of Agriculture and Natural Resources (IANR). Other divisions include the Cooperative Extension Division and the College of Agricultural Sciences and Natur al Resources.

This annual report describes the Agricultural Research Division program impacts and accomplishments for fiscal year 2001 as required by the Agricultural Research, Extension, and Education Reform Act of 1998. It includes the elements identified in the USDA document, "Guidelines for Land Grant Institution - Annual Report." This federal annual report is based on the implementation of the current Strategic Plan of the Institute of Agriculture and Natural Resources and on emerging issues identified through stakeholder input in anticipation of beginning the next revision of the IANR Strategic Plan. This federal annual report is for the University of Nebraska Agricultural Research Division only, but was developed in conjunction with University of Nebraska Cooperative Extension Division's annual report.

In FY 2001, Agricultural Research Division expenditures in support of the programs described in this plan totaled $63,748,703. Of this amount, Federal Formula Funds provided $3,503,194 or 5.5% of the total funds expended.

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Agricultural Research Division

2001 Agricultural Research Division
Plan of Work
Annual Report

A. PLANNED PROGRAMS

Federal Goal I. To achieve an agricultural production system that is highly competitive in the global economy.

Overview - Research Results Related to Goal 1

Under this goal area, research programs relate to the production, marketing and processing of the major livestock species, traditional field crops, speciality crops such as dry edible beans and turf. The research also relates to new crops, increased instate production and processing and development of new products and services. There were a number of significant outputs from the research programs which will be mentioned here. Impact statements are enclosed at the end of this section providing more detail.

Several new, higher value beef products are creating excitement in industry and helping to boost consumer demand for beef. The science behind these new cuts comes from University of Nebraska research. Meat scientists studied more than 5,500 muscles in the beef chuck and round and identified higher value potential in muscles traditionally used for ground beef or roasts. Collaboration with the National Cattlemen's Beef Association and industry is helping to translate the findings into innovative higher value products to provide economical new cuts for cost-conscience consumers and increase carcass value. These cuts sell for $2.99 to $5.99 per pound, compared with roasts and ground beef that typically bring about $1.19 to $1.99 per pound.

Sugarbeets are a traditional major crop in Nebraska's Panhandle and in irrigated areas of nearby North Great Plains States. Production declined during the mid-1990s, partly because grower unknowingly planted varieties susceptible to regional insects and diseases. To end this trend, the University of Nebraska agricultural research and extension team at the Panhandle Research and Extension Center in Scottsbluff, conducted large-scale trials and provided information about sugarbeet management and variety performance. They also worked cooperatively with engineers and scientists from other institutions in the area. Findings have been shared with growers through meetings, field days, and publication, including a new Sugarbeet Production Guide. Panhandle sugarbeet yields have increased an average of three tons per acre since this work began. Sugar content has increased, and 8,000 Nebraska acres have returned to beet production.

U.S. agriculture poultry producers generate nearly 190,000 tons of egg shells annually. University of Nebraska Institute of Agriculture and Natural Resources researchers have developed a process that turns eggshell into a dietary supplement equivalent to monocalcium or dicalcium phosphate, the most common phosphorous supplement for livestock and pets. The University is patenting this process and commercialization is being explored. Researchers estimate eggshell-derived phosphorous supplements could be worth $250 or more per ton compared with $40 per ton as calcium source in chicken feed, or could save $20 - $40 per ton charged for landfill disposal.

Institute of Agriculture and Natural Resources scient ists are zeroing in on what they believe is a major gene responsible for yield in wheat. They have narrowed the genes' location to a small segment on the tip of one of wheat's twenty-one chromosome pairs and are using molecular biology tools to pinpoint its location. Their findings suggest that this single gene is responsible for boosting wheat yields about 15%. Discovering a major gene controlling yield will allow scientists to decipher the genetic mechanism responsible for this complex, economically imp ortant trait which will be of value in the wheat breeding program to produce higher yielding wheats for growers.

In other plant genomic research, soybean lines with high oleic acid content developed by an IANR team could be the basis for future biodiesel fuels, healthier cooking oils, and more stable commodity oils. IANR soybean researchers, plant scientists and biotechnologists are collaborating to produce and evaluate the genetically modified, high oleic acid soybean lines. The modified plants contain a gene that revs up oleic acid production of 80-90% oleic acid content, compared to 15-20% in conventional soybeans.

Examples of accomplishments are included in the attached impact statements which are organized by key themes. These examples are ample evidence of the impact that the Agricultural Research Division outputs are making towards the specific Nebraska ARD goals under Federal Goal 1. The Nebraska goals are:

1. Enhance plant and animal production systems to be more profitable and sustainable.
2. Support agribusiness and economic development, including product marketing and value -added processing of agricultural commodities.
3. Increase public/consumer understanding of food systems.

Examples cited each contribute to one or more of these Nebraska goals.

Goal I Resources

Source of Funds	Federal Formula *	State	All other sources	Total
FY 2001 Expenditures ($ x 1000)	$2 ,375	$20,168	$20,679	$43,222
Faculty SYs in FY 2001 - 80.4				

* Includes Hatch, Multistate, McIntire Stennis and Animal Health Funds

Impact Statements Related to Federal Goal I - Identified by Key Themes

Category: Competitive Agricultural Systems in a Global Economy
Key Theme: Adding Value to New and Old Agricultural Products
Impact Statement: New Beef Products Add Value
(Relates to Nebraska Subgoal 2, Output Indicator 4, and Outcome Indicator 2)

Issue:

Several new beef products developed from traditionally undervalued portions of the beef chuck and round are sparking industry and consumer interest. The science behind the se new cuts is rooted in land grant university research.

What has been done?

Meat scientists at the University of Nebraska's Institute of Agriculture and Natural Resources and University of Florida analyzed more than 5,500 muscles in the beef chuck and ro und to learn which might be better used. They identified higher value potential in numerous muscles traditionally used for ground beef or roasts. Nebraska scientists compiled findings in a CD-ROM and comprehensive booklet industry can use to identify promising muscles for new products. They have worked closely with the National Cattlemen's Beef Association and industry to call attention to these muscles' potential.

Impact:

The beef industry is using these findings to create innovative, higher value product s that offer economical new cuts for cost-conscious consumers and boost carcass value. The best known of NCBA's new Beef Value Cuts is the flat iron steak, which is showing up on restaurant menus nationwide and at some meat counters. Others are in the works. These new cuts sell for $2.99 to $5.99 per pound compared with roasts and ground beef that typically bring about $1.19 to $1.99 per pound.

An official for a Nebraska-based food company that markets nationally and internationally said this research adds value to the beef carcass and benefits all aspects of the industry. The flat iron steak is a growing part of the company's business. "We expect it to be a major percentage of our overall steak volume. And consumers get reasonably priced meat that eats very well."

Funding:

Cattlemen's Beef Board
Nebraska Beef Council
NU Agricultural Research Division
Hatch Act

Scope of Impact: National

Summary:

Several new, higher value beef products are creating excitement in industry and helping to boost consumer demand for beef. The science behind these new cuts comes from University of Nebraska research. Meat scientists studied more than 5,500 muscles in the beef chuck and round and identified higher value potential in muscles traditionally used for ground beef or roas ts. Collaboration with the National Cattlemen's Beef Association and industry is helping translate the findings into innovative, higher value products to provide economical new cuts for cost-conscious consumers and increase carcass value. The best known of the new products is the flat iron steak. Others are in the works. These cuts sell for $2.99 to

$5.99 per pound compared with roasts and ground beef that typically bring about $1.19 to $1.99 per pound.

Category: Competitive Agricultural Systems in a Global Economy

Key Theme: Plant Production Efficiency

Impact Statement: Sugarbeet Team Helps Boost Yields

(Relates to Nebraska Subgoal 1, Output Indicators 1, 5, and Outcome Indicators 1,5)

Issue:

Sugarbeets are a major crop in Nebraska's Panhandle, but production declined during the mid-1990s, partly because growers unknowingly planted varieties susceptible to regional insects and diseases.

What has been done?

A University of Nebraska research and extension team at the Panhandle Research and Extension Center in Scottsbluff launched a major effort to improve sugarbeet production and profitability. They conducted large-scale sugarbeet variety trials from 1997 to 2000 in Nebraska, Colorado and Wyoming. Results provided information about sugarbeet planting and management, variety response to irrigation, herbicides, insects and diseases, and discoveries about emerging diseases and insects. This research showed that proper variety selection is a key to dealing with a variety of production problems. The NU Institute of Agriculture and Natural Resources team shared results with growers at meetings and field days in Nebraska, Colorado, Wyoming and Montana, and distributed booklets summarizing their findings.

Impact:

Thanks largely to this work, Panhandl e sugarbeet yields have increased an average of 3 tons per acre since this work began. Sugar content also has increased, which means growers earn more for their beets. And 8,000 Nebraska acres have returned to sugarbeet production. This research also influenced how growers select varieties. In 2001, a majority of the beet varieties grown in the Panhandle were resistant to root aphid.

Funding:

NU Cooperative Extension
NU Agricultural Research Division
Hatch Act
Western Sugar Co. Grower Joint Research Committee
Western Sugar Co.
Holly Sugar Co. Grower Research Committee
Holly Sugar Co.

Scope of Impact: Regional, Northern Great Plains

Summary:

Sugarbeets are a traditional major crop in Nebraska's Panhandle, but production declined during the mid-1990s, partly because growers unknowingly planted varieties susceptible to regional insects and diseases. To stem this trend, a University of Nebraska agricultural research and extension team at the Panhandle Research and Extension Center in Scottsbluff conducted large-scale trials that provided information about sugarbeet management and variety performance. They shared findings with growers through meetings, field days and publications. Thanks largely to this effort, Panhandle sugarbeet yields have

increased an average of 3 tons per acre since this work began, sugar content has increased and 8,000 Nebraska acres have returned to beet production. This research also influenced how growers select varieties. In 2001, a majority of the beet varieties grown in the Panhandle w ere resistant to root aphid.

Category: **Competitive Agricultural Systems in a Global Environment**
Agriculture in Greater Harmony with the Environment

Key Theme: ***Adding Value to New and Old Agricultural Products, Agricultural Profitability***

Impact Statement: Converting Eggshell Waste

(Relates to Nebraska Subgoal 1, Output Indicators 1, 3, and Outcome Indicator 3)

Issue:

U.S. egg processors and hatcheries generate nearly 190,000 tons of shells annually. In Nebraska, a leading egg processing state, shells are spread on Ag land for calcium or reprocessed as a dietary calcium source for poultry. In states with less agricultural land, landfill disposal runs $20 to $40 per ton.

What has been done?

University of Nebraska poultry scientists developed a process that turns eggshells into a supplement equivalent to monocalcium or dicalcium phosphate, the most common phosphorus supplements for poultry, livestock and pets. The university filed a patent on this process and researchers are exploring commercialization potential, which likely will increase as disposal costs climb.

Impact:

Researchers estimate eggshell-derived phosphorus supplements could be worth $250 or more per ton compared with $40 per ton as a calcium source in chicken feed. More importantly, turning waste into a useful product could reduce disposal costs and save landfill space in some states.

Funding:

NU Agricultural Research Division
Hatch Act

Scope of Impact: **National**

Summary:

U.S. egg processors generate nearly 190,000 tons of shells annually. NU Institute of Agriculture and Natural Resources researchers have developed a process that turns eggshells into a dietary supplement equivalent to monocalcium or dicalcium phosphate, the most common phosphor us supplements for livestock and pets. The university is patenting this process and researchers are exploring commercialization. Researchers estimate eggshell-derived phosphorus supplements could be worth $250 or more per ton compared with $40 per ton as a calcium source in chicken feed, or could save $20 to $40 per ton charged for landfill disposal.

Category: Competitive Agricultural Systems in a Global Economy

Key Theme: Plant Genomics

Impact Statement: Tracking Wheat Yield Gene

(Relates to Nebraska Subgoal 1, Output Indicator 2, and Outcome Indicators 1,3)

Issue:

Yield is a pivotal crop trait but little is known about which genes influence yield and how they function. University of Nebraska agronomists are on the trail of some answers.

What has been done?

NU Institute of Agriculture and Natural Resources scientists are zeroing in on what they believe is a major gene responsible for yield in wheat. They've narrowed the gene's location to a small segment on the tip of one of wheat's 21 chromosome pairs and are using molecular biology techniques to pinpoint its exact location. Their findings suggest that this single gene is responsible for boosting wheat yields about 15 percent. These findings are particularly significant because y ield is extremely complex and scientists long have thought it's unlikely that a single gene would have a major yield influence.

Impact:

This research has implications for both scientists and wheat farmers. Identifying a major gene controlling yield will allow scientists to decipher the genetic mechanisms responsible for this complex and economically important trait. The team aims to find and clone the gene and eventually incorporate it into NU's wheat breeding program to produce higher-yielding wheats for Nebraska growers.

Funding:

NU Agricultural Research Division
Hatch Act
USDA National Research Initiative competitive grant
Nebraska Wheat Board

Scope of Impact: International

Summary:

Yield is a pivotal crop trait, yet little is known about which genes influence yield and how they function. University of Nebraska agronomy researchers are tracking down some answers. These Institute of Agriculture and Natural Resources scientists are zero ing in on what they believe is a major gene responsible for yield in wheat. They've narrowed the gene's location to a small segment on the tip of one of wheat's 21 chromosome pairs and are using molecular biology tools to pinpoint its location. Their findi ngs suggest this single gene is responsible for boosting wheat yields about 15 percent. Discovering a major gene controlling yield will allow scientists to decipher the genetic mechanisms responsible for this complex, economically important trait. Eventually, this gene and knowledge gained from this work could be incorporated into NU's wheat breeding program to produce higher-yielding wheats for growers.

Federal Goal II. A Safe, Secure Food and Fiber System

Food animal production and food processing are major components of the Nebraska economy and the Nebraska Agricultural Research Division maintains a significant food safety research effort. Research faculty working in this area are working closely with the food industry and regulatory industries to f ocus research efforts in the most critical problems as well as future issues. Significant effort is also being made on research of pre-harvest food safety areas, in particular, working with livestock producers. This work is integrated closely with efforts of Cooperative Extension to use the food safety research outputs to effectively conduct food safety education and demonstration programs.

The Nebraska goals under this federal goal are:

1. Animal and plant production systems and food processing and pro duction systems to be enhanced to improve food safety and quality

2. Research based information will increase awareness of consumers, producers, food processors, food handlers and extension personnel on food safety issues and technologies.

A major component of the food safety research program which has made excellent progress is the research working with the dangerous *E. coli* 0157:H7 bacteria. This bacteria is a major public health threat and has caused significant disease outbreaks as well as causing s ignificant recalls of food products, primarily meat. ARD scientists have made steps forward which can have significant impact on controlling this problem in the future. First, studies of *E. coli* 0157:H7 in the feedlot have developed significant new knowledge about the incidence and transmission of this organism among cattle in feedlots. This knowledge will be critical in helping to reduce pathogen incidence prior to slaughter.

University of Nebraska scientists devised a simple, economical way to test pens of cattle for *E. coli* 0157:H7 without handling individual animals. They hang pieces of rope around a pen. Cattle soon lick or shew the rope, leaving traces of the organisms they are carrying. Laboratory tests of the ropes detect *E. coli* 0157:H7. The team is refining this test as a research tool and using it to help identify strategies that producers can use to control the bacteria in feedlots.

IANR scientists continue to work with the United States' only federally inspected air-chilled poultry plant which is located in Nebraska. Recent IANR research has indicated that chickens chilled with cool air may be less likely to be contaminated with disease causing organisms and last longer than broilers cooled in water. These preliminary findings are t he basis for broader farm-to-table research, including study of chicken farms to take safer chicken to market by pin-pointing factors throughout the production process that influence safety. This research could yield new guidelines for handling broilers.

In response to Bovine Spongiform Encephalopathy (BSE) and Food and Mouth Disease outbreaks in Europe and other countries and to recent terrorist acts and the threat of bioterrorism, new policies and procedures have been developed and implemented to reduce risk at university research and extension locations. Research and Extension faculty have worked with other state agencies and industry to provide science-based information for developing effective policies and procedures for the state.

Goal II Resources

Source of Funds	Federal Formula *	State	All other sources	Total
FY 2001 Expenditures ($ x 1000)	$189	$1,606	$1,647	$3,442
Faculty SYs in FY 2001 - 8.5				

* Includes Hatch, Multistate, McIntire Stennis and Animal Health Funds

Impact Statement Related to Federal Goal II - Identified by Key Themes

Category: Safe and Secure Food & Fiber Systems

Key Theme: Food Safety

Impact Statement: *E. coli* Pen Test

(Relates to Nebraska Subgoal 1, Output Indicator 1, and Outcome Indicators 1, 2)

Issue:

Devising strategies to control *E. coli* 0157:H7 on the farm should help keep the dangerous bacteria from reaching consumers. Finding simple, easy ways to test groups of cattle for *E. coli* 0157:H7 is a key step in developing on-farm food safety efforts.

What's been done?

University of Nebraska scientists devised a simple, effective, economical way to test pens of cattle without handling individual animals. They hang pieces of rope around a pen. Within two hours, cattle chew or lick the ropes, leaving traces of the organisms they're carrying. Laboratory tests of the ropes detect *E. coli* 0157:H7. This test proved effective in on-farm studies. The team is refining it as a research tool and is using it to identify strategies producers can use to control *E. coli* 0157:H7 in feedlots. It's part of ongoing Institute of Agriculture and Natural Resources on-farm food safety research.

Impact:

The rope test allows researchers to identify environmental and management factors that influence the prevalence of *E. coli* 0157:H7 in pens of cattle throughout the feeding period and to evaluate the control strategies producers can use to reduce the likelihood of cattle leaving feedlots carrying the bacteria. While the rope test was devised as a research tool, someday it could help producers match food safety intervention strategies to specific pens of cattle.

Funding:

USDA National Research Initiative competitive grant
Nebraska Beef Council
Nebraska Legislative Bill 1206
NU Agricultural Research Division
Hatch Act

Scope of Impact: National

Summary:

University of Nebraska scientists devised a simple, effective, economical way to test pens of cattle for *E. coli* 0157:H7 without handling individual animals. They hang pieces of rope around a pen. Cattle soon chew or lick the rope, leaving traces of the organisms they're carrying. Laboratory tests of the ropes detect *E. coli* 0157:H7. The team is refining the test as a research tool and using it to identify strategies producers can use to control the bacteria in feedlots. This work is part of ongoing Institute of Agriculture and Natural Resources on-farm food safety research to control the dangerous bacteria on farms, ranches and feedlots to reduce the chances of it reaching consumers.

Federal Goal III. A Healthy Well-nourished Population

The Nebraska goal in this area is to enhance the quality of life of individuals and families through healthy lifestyles including better nutrition and reduction of high risk activity. Particular areas of research emphasis include lipid metabolism, bioavailability of nutrients, eating behaviors and disorders, biochemistry of cardiac illnesses and function of health care and family support systems. In addition to being incorporated in Cooperative Extension educational programs, research results are also used by a broad range of health care professionals, educators, and marketers and consumers of all ages.

UNL researchers recently studied diets of Nebraska girls, ages 8 - 17. They found girls as young as eight thought about dieting. From age eleven and up, girls studied were already dieting and researchers found their diets low in key nutrients. Dieters ate fewer calories and consumed significantly less calcium, other minerals and vitamin B-6 than non-dieters. Participants averaged about 850 milligrams of calcium daily, far less than the recommended 1,300 milligrams for girls ages 9 - 18, putting them at risk for osteoporosis later in life.

Goal III activity also includes programs related to other aspects of agricultural safety and health, such as, risks associated with up-take and metabolic effects of pesticide combinations on mammalian systems, particularly through dermal exposure.

Other research deals with the ultraviolet protective properties of different fabrics used in clothing. A University of Nebraska textile scientist's research on fabrics UV-protective properties has provided information for clothing makers and help lay groundwork for national standards for sun-protective clothing. This activity is in cooperation with larger multistate project related to protective clothing for several purposes.

The above examples and the impact statement to follow identify the types of contributions being made by the Institute of Agriculture and Natural Resources research activities to Federal Goal III.

Goal III Resources

Source of Funds	Federal Formula *	State	All other sources	Total
FY 2001 Expenditures ($ x 1000)	$84	$714	$732	$1,530
Faculty SYs in FY 2001 - 4.6				

* Includes Hatch, Multistate, McIntire Stennis and Animal Health Funds

Impact Statements Related to Federal Goal III - Identified by Key Themes

Category: Healthy, Well-Nourished Population

Key Theme: Human Health

Impact Statement: Sun Protective Clothing Standards

(Relates to Nebraska Subgoal 1, and Output Indicators 2 & 4)

Issue:

Consumers need assurances that clothing marketed for sun protection actually blocks harmful ultraviolet radiation. For people who have skin cancer or are undergoing radiation or chemotherapy, adequate sun protection can be a life or death matter.

What has been done?

A University of Nebraska textile scientist extensively studied different fabrics ' ultraviolet protective properties. This Institute of Agriculture and Natural Resources research provided information for clothing makers and helped lay groundwork for national standards for sun-protective clothing. This scientist has been a leader on national committees that worked with federal consumer protection agencies to develop standards for testing and labeling UV-protective clothing.

Impact:

Standards for sun-protective clothing were finalized in 2000. Standards are voluntary, but the clothing industry is being urged to quickly adopt them. Standardization should help consumers make better-informed decisions and assure that protective clothing delivers the UV protection it promises.

Funding:

NU Agricultural Research Division
College of Human Resources and Family Sciences
Hatch Act

Scope of Impact: International

Summary:

Consumers need assurances that clothing marketed for sun protection actually blocks harmful ultraviolet radiation. A University of Nebraska textile scientist's research on fabrics ' UV-protective properties has provided information for clothing makers and helped lay groundwork for national standards for sun-protective clothing. This Institute of Agriculture and Natural Resources scientist has been a leader on national committees developing standards for testing and labeling UV-protective clothing. Thanks in part to this work, standards for sun-protective clothing were finalized in 2000. Standardization should help consumers make better-informed decisions and assure that protective clothing delivers the UV protection it promises.

Federal Goal IV. To Achieve Greater Harmony (Balance) Between Agriculture and the Environment

Research activities in support of federal goal area IV have increased in recent years as a result of redirected research resources and of improved external grant support. Improved natural resources management and environmental quality, while maintaining a productive and profitable agricultural industry, is clearly identified as one of the three major themes in the Nebraska ARD Strategic Plan. The Nebraska goals under this federal goal area are:

1. Programs that focus on conserving and enhancing air, soil and water resources and improving environmental quality.

2. Improve ecosystem management for sustained productivity and enhance biodiversity.

3. Provide information and expertise on natural resources and environmental issues that facilitate policy development and successful implementation programs.

Concerns about global climate change are mounting because of increasing atmospheric concentrations of carbon dioxide, a major greenhouse gas. Understanding how to store more carbon in crop land could help reduce the threat of global warming, and farmers might earn extra income for enhanced carbon storage. NU Institute of Agriculture and Natural Resour ces scientists are leading interdisciplinary research to measure, compare and understand carbon dioxide's movement through the atmosphere, plants and soils, and irrigated and dry land cropping systems. They aim to identify the factors influencing carbon movement and develop cost effective management practices farmers can use to boost carbon storage.

Methane is a major greenhouse gas and the world's agricultural livestock produce about 17% of the methane in the atmosphere. University of Nebraska scientist s have found a way that might cut the amount of methane cattle produce during digestion and enhance fatty acids that cattle use for energy. The scientists have developed several compounds that inhibit a key methane-production enzyme in the cattle's digest ive tracts. The inhibitors work in the laboratory, but scientists must still test in cattle. If these inhibitors work in cattle, the environment could be the big winner.

University of Nebraska researchers are refining a technique for injecting methanol acetate into groundwater to inexpensively and effectively reduce groundwater nitrate concentrations. Nitrate contamination is a serious concern for municipal and private drinking water wells in Nebraska. More than 100 public water suppliers in Nebraska sample their municipal wells quarterly because nitrate levels exceed 8 ppm, close to the federal 10 ppm limit. The ethanol and acetate stimulate natural soil micro-organisms that denitrify the water. This simple technique can be used to reduce nitrate con tamination in groundwater and help small utilities inexpensively meet the nitrate standards.

Goal IV Resources

Source of Funds	Federal Formula *	State	All other sources	Total

FY 2001 Expenditures ($ x 1000)	$785	$6,663	$6,832	$14,280
Faculty SYs in FY 2001 - 31.8				

* Includes Hatch, Multistate, McIntire Stennis and Animal Health Funds

Impact Statements Related to Federal Goal IV - Identified by Key Themes

Category: Greater Harmony Between Agriculture and the Environment

Key Theme: Global change and Climate Change

Impact Statement: Reducing Livestock Methane

(Relates to Nebraska Subgoal 1, Output Indicators 2 & 5, and Outcome Indicator 3)

Issue:

As the second most abundant greenhouse gas, methane plays a significant role in global warming. The world's agricultural livestock produce about 17 percent of the methane in the atmosphere. Finding ways to reduce methane production in cattle could help the environment and cut feed costs.

What has been done?

Methane is a byproduct of digestion in cattle and other ruminants. University of Nebraska scientists have found a way that might cut the amount of methane cattle produce during digestion and enhance fat ty acids that cattle use for energy. A biochemist, chemist and animal scientist teamed up to design and test several chemical compounds that block methane production by inhibiting a key enzyme. The methane - blockers work well in the lab; they still must be tested in cattle. The university is patenting the team's novel methane inhibitors and the concept. Researchers are working with a private company to explore commercializing a cattle feed additive designed to improve feed efficiency by reducing methane.

Impact:

Between 5 percent and 15 percent of digestible energy in feed is lost as methane gas so inhibiting methane would reduce feed requirements and feed costs. The environment could be the big winner if the NU-developed inhibitors prove useful and become w idely used. An NU researcher estimates that reducing methane produced by livestock by 50 percent could significantly reduce global warming.

Funding:

National Institutes of Health
Restoragen Inc.
NU Agricultural Research Division
Hatch Act

Scope of Impact: International

Summary:

Methane is a major greenhouse gas and the world's agricultural livestock produce about 17 percent of the methane in the atmosphere. The environment and cattle producers both could benefit if cattle produce less methane. University of Nebraska scientists developed several compounds that inhibit a key methane - production enzyme in cattle's digestive tracts. The inhibitors work in the lab; scientists still must test them in cattle. NU is patenting their inhibitors and concept. Researcher s are working with a private company on a potential commercial feed additive designed to improve feed efficiency by reducing methane. If these

inhibitors work in cattle, the environment could be the big winner. An NU researcher estimates that reducing livestock methane by 50 percent could significantly reduce global warming.

Category: Greater Harmony Between Agriculture and the Environment
Key Theme: Global Change and Climate Change
Impact Statement: Measuring Carbon Storage in Cropland
(Relates to Nebraska Subgoals 1, 2, & 3, Output Indicators 2 & 6, and Outcome Indicators 1, 2 &3)
Issue:

Concerns about global climate change are mounting because of increasing atmospheric concentrations of carbon dioxide (CO_2), a major greenhouse gas. Understanding how to store more carbon in cropland could help reduce the threat of global warming, and farmers might earn extra income for enhancing carbon storage.

What has been done?

University of Nebraska Institute of Agriculture and Natural Resources scientists are leading research to measure and understand how carbon cycles through the atmosphere, plants and soil in cropland. They're closely measuring all CO_2 entering and leaving fields in their 420-acre outdoor laboratory. They have developed a state-of-the-art facility to extensively track CO_2 in an entire agricultural system and compare different cropping systems at a scale comparable to commercial farming. They're also comparing how different crops and farming practices influence carbon storage and movement in the plant-soil system. They'll use this information to develop recommendations on cost-effective management practices to increase carbon storage and to help quantify cropland carbon storage.

Impact:

This research will provide practical information to help farmers increase carbon storage on their land, assess the production costs involved and better quantify the carbon storage benefits of various practices. Such information will be critically important to maximize potential benefits to Nebraska farmers if programs are established to provide compensation for storing carbon in cropland.

Funding:

U.S. Department of Energy
Nebraska Corn Board
NU Agricultural Research Division
Hatch Act

Scope of Impact: **International**

Summary:

Concerns about global climate change are mounting because of increasing atmospheric concentrations of carbon dioxide, a major greenhouse gas. Understanding how to store more carbon in cropland could help reduce the threat of global warming, and farmers might earn extra income for enhancing carbon storage. NU Institute of Agriculture and Natural Resources scientists are heading interdisciplinary

research to measure, compare and understand carbon dioxide's movement through the atmosphere, plants and soil in irrigated and dryland cropping systems. They've developed a 420-acre, state-of-the-art research facility to examine carbon storage in an entire agricultural system. They aim to identify the factors influencing carbon movement and develop cost-effective management practices farmers can use to boost carbon storage. Such information will be important to maximize potential benefits to Nebraska farmers if programs are established to provide compensation for storing carbon in cropland.

Category: Greater Harmony Between Agriculture and the Environment

Key Theme: Water Quality

Impact Statement: Denitrifying Nitrate in Groundwater

(Relates to Nebraska Subgoal 1, Output Indicator 2, and Outcome Indicators 3 & 4)

Issue:

Nitrate groundwater contamination is a serious concern in many municipal and private drinking water wells across Nebraska. More than 100 public water suppliers in Nebraska sample their municipal wells quarterly because nitrate levels exceed 8 parts per million, close to the federal 10 ppm limit. Others are shut down because they exceed the limit.

What has been done?

University of Nebraska researchers are refining a technique for injecting ethanol and acetate into contaminated groundwater to inexpensively and effectively reduce groundwater nitrate concentrations. Ethanol and acetate stimulate natural soil microorganisms that convert nitrates to innocuous nitrogen gas. The result is clean drinking water. The technique is sustainable because ethanol and acetate are non-toxic, biodegradable and inexpensive. A pilot demonstration project is scheduled for operation at the Wahoo city well field in 2002.

Impact:

Making this technique available to municipal water system operators should help them inexpensively denitrify wells and protect the public from health concerns associated with elevated groundwater nitrate levels. In pilot studies, this method reduced groundwater nitrate contamination from 40 ppm to as little as 8 ppm in a short time. Similar results in a municipal well field would bring nitrate levels into compliance.

Funding:

NU Agricultural Research Division
Hatch Act
UNL Water Center
Central Platte Natural Resources District
Lower Platte North Natural Resources District
City of Wahoo

Scope of Impact: National

Summary:

Nitrate contamination is a serious concern for municipal and private drinking water wells in Nebraska. More than 100 public water suppliers in Nebraska sample their municipal wells quarterly because nitrate levels exceed 8 parts per million, close to the federal 10 ppm limit. Others are shut down because they exceed the limit. NU Institute of Agriculture and Natural Resource researchers developed a technique for injecting ethanol and acetate into contaminated wells to inexpensively, effective ly reduce nitrate concentrations. The ethanol and acetate stimulate natural soil microorganisms that denitrify the water. This simple technique eventually could help small utilities inexpensively, sustainable denitrify wells and protect the public from health concerns associated with nitrate contamination. In pilot studies, this method reduced nitrate contamination from 40 parts per million to as little as 8 ppm.

Federal Goal V. To Enhance Economic Opportunities and the Quality of Life Among Families and Communities

The changing demography of Nebraska reflects greater cultural diversity, more older persons, declines in rural population and more children and families living at poverty level incomes. Many areas of the state need enhanced entrepreneurial opportunities, business management and computer skills for small home-based and family owned businesses. ARD research programs deal with policy issues as well as research to assist educational programs in this area. The research programs are heavily linked to Cooperative Extension educational program activities. The specific Nebraska goals related to this area are:

1. Enhanced basic life skills for Nebraska's children, youth and adults.
2. To improve human nutrition and health.
3. To enhance business and livable employment opportunities.

The latest Rural Nebraska Poll conducted by the IANR Center for Applied Rural Innovation showed that nearly two-thirds of rural Nebraskans say that their income has not kept pace with the cost of living and 61% faced at least one economic hardship in the past year. For the past six years, IANR researchers associated with the CARI Center has surveyed rural Nebraskans about quality of life and policy issues. These and other poll results provide a rural perspective for decision makers, law makers and others making public policy choices and planning for the State's future.

The Internet may be the way of the future, but for now rural residents are happier with bricks-and-mortar shopping. University of Nebraska research found that less than 20% of rural residents polled in eleven states shop the Internet or television for food and clothing. The research is conducted as part of a multistate research project. Researchers found that rural residents are most satisfied with traditional retail shopping and are reluctant to use credit cards for mail or Internet shopping because of security issues.

Another major change to a few rural communities has been the establishment or change in the meat packing industry. A plant brings economic growth, rapid change and new residents to a community. NU Institute of Agriculture and Natural Resources researchers are examining the meat processing industry's economic, social and physical impacts on communities and the ir residents. They are working directly with three communities to identify issues important to the long -term and immigrant residents alike. Issues include availability of community resources, job training, housing and education. This research will help communities develop strategies to handle rapid changes and to promote cooperation between culturally diverse populations.

Goal V **Resources**

Source of Funds	Federal Formula *	State	All other sources	Total
FY 2001 Expenditures ($ x 1000)	$70	$595	$610	$1,275
Faculty SYs in FY 2001 - 4.9				

* Includes Hatch, Multistate, McIntire Stennis and Animal Health Funds

Impact Statements Related to Federal Goal V - Identified by Key Themes

Category: Economic Development and Quality of Life for People and Communities

Key Theme: Impact of Change on Rural Communities

Impact Statement: Rural Residents and Cyber Shopping

(Relates to Nebraska subgoal 3, Output Indicator 6, and Outcome Indicator 4)

Issue:

The Internet someday might provide rural Americans the shopping choices and convenience that mail order catalogs offered their ancestors a generation earlier. So far, however, rural residents buy mostly at retail stores and are happiest with bricks-and-mortar shopping, University of Nebraska research shows.

What Has Been Done?

An NU College of Human Resources and Family Sciences merchandise management researcher examined technology's impact on rural consumer access to food and fiber products. As part of an 11-state study, researchers surveyed rural consumers. Less than 20 percent of the respondents use the Internet or television shopping channels to buy food or clothing. Researchers also found that rural residents are most satisfied with traditional retail shopping and are reluctant to use credit cards for mail or Internet shopping because of security issues. To detect changes over time, researchers will survey the same residents again in winter 2002-2003.

Impact:

Findings may help decision makers develop policies regarding electronic commerce and help rural businesses and communities adjust to potential changes in consumers' buying habits. The research also will help rural retailers identify qualities and services that will encourage customers to keep buying locally.

Funding:

NU Agricultural Research Division
Hatch Act

Scope of Impact: Multistate

Summary:

The Internet may be the way of the future, but for now rural residents are happier with bricks-and-mortar shopping. University of Nebraska research found that less than 20 percent of rural residents polled in 11 states shop the Internet or television for food or clothing. Researchers found rural residents are most satisfied with traditional retail shopping and are reluctant to use credit cards for mail or Internet shopping because of security issues. Findings from this ongoing study may help shape policies on electronic commerce and will help rural businesses identify qualities and services that will encourage customers to keep buying locally.

Category: Economic Development and Quality of Life for People and Communities

Key Theme: Impact of Change on Rural Communities

Impact Statement: Meat Plants Changing Rural Communities

(Relates to Nebraska subgoal 3, Output Indicator 1 & 7, and Outcome Indicator 1)

Issue:

Meat processing plants typically bring economic growth, rapid change and new residents to the rural communities where they operate. These changes often create tensions that leave longtime and new residents alike frustrated by divisions and communic ation barriers posed by different languages and cultures.

What has been done?

University of Nebraska researchers are examining the meat processing industry's economic, social and physical impacts on communities and their residents. They are working directly with three Nebraska communities where meat processing is a major employer to identify issues important to long -term and immigrant residents alike. Issues include availability of community resources, job training, housing, and education. Face-to-face interviews in 2000 and 2001 revealed longtime residents and newcomers share similar concerns about rapid demographic changes altering their communities. The next step is to interview residents in meat packing towns in several Midwestern states.

Impact:

Meat processing is changing the face of rural America. This research will help communities develop strategies to handle rapid changes and to promote cooperation between culturally diverse populations that ultimately will impact community viability.

Funding:

NU Agricultural Research Division
Hatch Act
NU College of Human Resources and Family Sciences

Scope of Impact: State Specific

Summary:

Meat packing plants are changing rural communities. A plant brings economic growth, rapid change and new residents to a community. NU Institute of Agriculture and Natural Resources researchers are examining the meat processing industry's economic, social and physical impacts on communities and their residents. They are working directly with three communities to identi fy issues important to long -term and immigrant residents alike. Issues include availability of community resources, job training, housing and education. This research will help communities develop strategies to handle rapid changes and to promote cooperati on between culturally diverse populations.

B. STAKEHOLDER INPUT PROCESS

The processes used for stakeholder input for the Agricultural Research Division were described in detail in the initial ARD Plan of Work. Nebraska has had an extensive system of stakeholder input in place for many years and no new processes were initiated in the year 2001. Statewide stakeholder input was obtained for the Nebraska Institute of Agriculture and Natural Resources for the 2000-2008 Strategic Plan. Comprehensive statewide stakeholder input will not be done again until preparations are begun to revise the Strategic Plan. Major changes in strategic direction do not happen as frequently as annually, so major stakeholder input processes designed to support this overall effort are done on a less frequent basis. However, there are many other stakeholder input processes in place which provide input on an annual or more frequent basis.

The Agricultural Research Division and the Cooperative Extension Division collaborate routinely in the planning and development of programs. These divisions, as part of the Institute of Agricultural and Natural Resources (IANR), have been partners in development of Strategic Plans for over 10 years. Several of the stakeholder input processes described in the 2001 Annual Progress Report for the Cooperative Extension Division will impact Agriculture Research Division planning.

a) Actions Taken to Seek Stakeholder Input

Several IANR departments, research and extension centers, interdisciplinary centers and program areas have external advisory groups representing stakeholders and users. These groups meet at least annually and provide input on current and future programs of the units. The Agronomy Department Advisory Board has 25 members who met twice in 2001. They provided information on strategic issues related to Agronomy and Horticulture teaching, research and extension. An Animal Science Department Advisory Committee was established in 2001 and has met twice. It has 27 members from various segments of the livestock, meat, and feed industry.

The Northeast Nebraska Experimental Farm Association serves as the stakeholder input group for the Northeast Research and Extension Center and Haskell Agricultural Laboratory. This group consists of representatives from each of the counties in the northeast district and meets annually to provide input on program needs at NEREC. Other research centers with advisory committees which meet annually include the High Plains Agricultural Lab and the Gudmundsen Sandhills Lab. Examples of programs which have advisory committee meetings which meet at least annually include the Republican River Basin Irrigation Management Demonstration Project and the *E. coli* 0157:H7 Food Safety Research Program.

The Cooperative Extension Division has organized action teams for major program areas to plan and implement educational programs. Many of the members of these action teams are faculty with joint research and extension appointments. In 2001, each action team was required to develop a process and obtain appropriate stakeholder input for that program area. This process resulted in a significant level of stakeholder input which is impacting both extension education for the future and research programs which provide the scientific information for the educational programs.

b) Brief Statement of the Process Used by the Recipient Institution to Identify Individuals in Groups Who are Stakeholders and to Elect Input from Them

The Animal Science Advisory Committee meetings have focused on familiarizing members with research, extension, and teaching programs. Future meetings will emphasize Committee input on future needs, although some of that is already happening.

The Southeast Research and Extension District, in preparation for comprehensive annual program review, conducted a system of interviews with key leaders and knowledgeable observers. Groups of interviewees were identified to assure that under-served groups would be included.

The Department of Nutritional Science and Dietetics gets stakeholder input from two meetings annually of the Community Nutrition Partnership Council which coordinates with nutrition education for a limited resource audience. The members of the Council represent a broad group of state and local agencies, volunteer organizations, school officials, and others. They provide valuable input both on extension needs for Cooperative Extension and for research needs for these types of programs.

The Department of Biological Systems Engineering uses advisory council consisting of both in -state and out-of-state stakeholders that help to provide a perspective on research and education needs on a regional and national basis.

The Department of Agricultural Leadership, Education, and Communication's Advisory Council meets twice annually and consists of representative from clientele groups throughout the state.

The above examples are only a part of the on-going stakeholder process. While the types of membership for these advisory groups vary, in all cases the intent is to have a membership selection process which allows for good representation from all clientele groups and rotation of membership to allow different views to be brought in.

c) A Statement of How Collected Input was Considered

In nearly every case with the examples of advisory groups mentioned above, minutes of meetings and reports are maintained and revisited periodically to see if programs are adjusted to respond to the recommendations. It is essential for active advisory groups to continue that the membership is able to review and reflect upon what impact a group has had in earlier recommendations. Stakeholder input has been valuable to units in making d ecisions on which programs to emphasize or initiate as well as which programs to de-emphasize. Stakeholder input is often critical in helping units and administrators make decisions on which areas are highest priorities for filling a faculty positions. Since the filling of faculty positions is a critical element in refocusing programs, reaffirming priorities, or identifying emerging issues to address, the stakeholder input is very valuable in helping units and the Agricultural Research Division in making these decisions.

The University of Nebraska is currently involved in a state budget reduction process. Stakeholder input is important in deciding what program areas must be reduced to accomplish the budget reduction.

C. PROGRAM REVIEW PROCESS

Nebraska has made no significant changes in program review processes since the 5-Year Plan of Work was submitted. The scientific peer review process used the by Agricultural Research Division as described in the 5-Year Plan of Work remains the same.

D. EVALUATION OF THE SUCCESS OF MULTI AND JOINT ACTIVITIES

a) Did the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?

Critical issues of strategic importance identified by stakeholders are directly reflected in the IANR Strategic Plan. The Strategic Plan serves as a fundamental document which guides decision -making process on programs to emphasize and staffing decisions. ARD faculty currently participate in multi - state projects which are provided research funding support through the multistate research component of the Federal Formula Funds. These projects are selected and approved by regional Director Associations because they are high priority needs identified for multistate activity.

b) Did the planned programs address the needs of under-served and under-represented populations of the state?

ARD research programs related to human nutrition and healthy lifestyles were highlighted under the federal goals and key themes. The results of this research feed science -based information directly into Cooperative Extension programs which target under -served and under-represented populations. Nutritional sciences research includes the project on evaluating the nutritional characteristics of meat from American bison. This is important because the growth, production and use of American bison as a healthy meat source is increasing and the f act that bison herds have been started on Nebraska's Native American reservations. A research project on assessing managerial and work force development in food service management is providing information useful for effective training of low income and minority populations working in the food service area.

c) Did the planned programs describe the expected outcomes and impacts?

Output and outcome indicators were described in the 5-Year Plan of Work submitted in 2000. The impacts of the example projects described in the accomplishments and results section relate directly to these output and outcome indicators.

d) Did the planned programs result in improved program effectiveness and/or efficiency?

Effective documentation of research programs, joint program output and outcomes, and ultimately impacts is an important part of our program activity. Individual faculty members are expected to identify outcomes and impacts in their annual faculty reports. The impact reports that are included in the accomplishment section of this report are developed for use by stakeholders and originate with the impacts identified by individual faculty annually. Having to document individual impacts, as well

as interdisciplinary and joint program impacts keeps faculty focused on the need for productive programs.

The joint planning of multistate project activity results in less duplication and more cooperative program efforts. Many University of Nebraska IANR faculty have joint Agricultural Research Division and Cooperative Extension Division appointments. Therefore, joint planning is assured and this results in research programs that are directly related to Cooperative Extension's education needs. This arrangement definitely improved program effectiveness and/or efficiency.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the 5-Year Plan of Work
for Multistate Extension Activities and Integrated Activities

Institution: **University of Nebraska Agricultural Experiment Station**
State: **Nebraska**

Check one: ____ Multistate Extension Activities
_X_ Integrated Activities (Hatch Act Funds)
____ Integrated Activities (Smith-Lever Act Funds)

		Estimated Costs				
Title of Planned Program/Activity		**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Goal 1:	Integrated Crop Management Integrated Livestock Systems Management Integrated Pest Management Sustainable Agricultural Production Systems	$562,880	$633,823	$633,823	$633,823	$633,823
Goal 2:	Pre and Post Harvest Plant and Animal Food Safety Food Processing and Food Service Management Food Safety	$113,754	$81,427	$81,427	$81,427	$81,427
Goal 3:	Human Nutrition, Health and Safety Health Care	$21,645	$8,375	$8,375	$8,375	$8,375
Goal 4:	Natural Resources Management and Protection Environmental protection Environmental and Natural Resources Policy	$182,627	$299,047	$299,047	$299,047	$299,047
Goal 5:	Family Strengths Family Housing Telecommunications for Rural Areas Community Strengths	$130,934	$64,030	$64,030	$64,030	$64,030
Total		$1,011,840	$1,086,702	$1,086,702	$1,086,702	$1,086,702

_____	_____
Darrell W. Nelson, Director	Date

F. INTEGRATED RESEARCH AND EXTENSION ACTIVITIES

Below are a few examples of integrated Research and Extension activities.

Goal 1

Activity: Integrated Crop Management

In a cooperative activity with Colorado State University, Montana State University, University of Wyoming, and the USDA Agricultural Research Service, University of Nebraska Research and Extension faculty have recently published a new *"Sugarbeet Production Guide"*. This is an extensive reference publication which incorporates the results of many years of research and demonstration in all aspects of the sugarbeet production from field preparation to harvest. This production guide follows a similar publication, *"Dry Bean Production Guide"* which was produced by the same collaborators a few years earlier and has proven to be extremely valuable for producers and others in the dry bean industry. It is expected that the *Sugarbeet Production Guide* will also have a beneficial impact on the efficiency and profitability of the sugarbeet production in the Great Plains.

Activity: Integrated Livestock Management

Hot, still, humid days are potential killers in cattle feedlots. A single, severe heat wave in 1999 cost Nebraska producers more than $20 million in cattle deaths and performance losses. Management strategies developed through multistate research coordinated by a University of Nebraska animal scientist are helping to significantly reduce heat-related losses. The recommendations help make cattle comfortable without sacrificing overall performance by focusing on altering feeding routines and the feedlot's microclimate during hot spells. For example, changing feed schedules and intake during extreme heat keeps cattle cooler, avoids digestive problems and doesn't hurt overall performance.

These research results have been shared during research and extension field days, been the basis for inservice training with Extension Educators, and been shared directly with feedlot operators in a variety of settings. Monitoring of weather conditions allows Extension Specialists and Extension Educators to provide alerts to feedlot operators when special caution should be taken to prevent potential heat stress losses. It has been possible to take the heat stress research results directly to the producer with a proactive extension education program.

Activity: Integrated Pest Management

A key example of the integrated research-extension effort related to IPM is the insect management effort targeting European corn borer. The research effort has addressed alternative control options including chemical control and the use of genetically engineered plants that provide biological control. The research results are used directly in a variety of educational programs including Research Center Field Days, Crop Protection Clinics, Corn/Soybean Expos, and Crop Management and Diagnostic Clinics. The target audience of the clinics is agribusiness and crop consultants which helps to multiply the

transfer the research result to agricultural producers. The results of a new research effort in integrated weed management are being used in integrated weed management workshops and research center field days.

Activity: Sustainable Agriculture Production Systems

An example of an integrated research-extension effort related to livestock systems management as well as to the value-added area is the project "Fresh Water Prawn Farming: a new agribusiness for small Nebraska farmers". This project involves collaborators from the Agricultural Research Division, Cooperative Extension Division, and the College of Arts and Sciences. A ten member team is working to test the indoor farming of edible fresh water prawn (large shrimp) by small farm operators to provide supplemental income. A pilot demonstration is underway with 6,000 prawns now in cultu re for grow-out to market size in a former hog confinement facility.

With the decline in numbers of smaller hog producers, there are numerous hog confinement units now unoccupied and unused. This technology is a significant way to bring these facilities back into production. Continuous prawn production throughout the year occurs nowhere in the USA bus is essential for year-round marketing and sales of live whole prawns to the restaurant trade, primary market.

In addition, this industry would provide a ma rket for soybean meal, distillers of grains from corn and corn meal for a pelleted prawn food.

Goal 2

Activity: Pre and Post Harvest Plant and Animal Food Safety

Major grant funding has been obtained to support both the Agricultural Research Division food safety activity and the Cooperative Extension Division food safety activity. This activity is highly integrated between the two divisions. The Cooperative Extension action team which coordinates the program, entitled "Enhancing Food Safety in the Food Chain," includes specialists with joint research and extension appointments. The research team which addresses a major component of the food safety research, *E. coli* 0157:H7. includes faculty with both research and extension appointments. Initial research findings on the occurrence of *E. coli* 0157:H7 in pens of live cattle has produced results with potential short term application on reducing the *E. coli* 0157:H7 incidence in cattle feedlots. The highly integrated teams involved will be able to transfer this technology into application quickly when appropriate.

Activity: Food Processing and Food Service Management Food Safety

IANR Research and Extension faculty continue to work with the United States' only federally inspected air-chilled poultry plant which is located in Nebraska. IANR research has indicated that chickens chilled with cool air may be less likely to be contaminated with disease causing organisms and last longer

than broilers cooled in water. These preliminary findings are the bases for broader farm-to-table research, including study of chicken farms to take safer chicken to market by pin-pointing factors throughout the production process that influence safety. Extension and research programs are working together to develop new guidelines for handling broilers and incorporate this into educational programs. They also continue to work with the poultry plant to enhance food safety through processing. The company is successfully marketing this premium grade poultry and production is expanding.

Goal 3

Activities: Human Nutrition, Health and Safety and Health Care

The research and extension program activity in Nutrition, Health and Safety is an ongoing effort with the leadership provided by members of the Preventive Health and Wellness Team. This team which coordinates programming has faculty with joint research and extension appointments. Additional research input is received through collaborative relationships with the University of Nebraska Medical Center. Major foci of this effort are reducing high risk behaviors of individuals (adoption of healthy life style practices) and increasing farm safety practices. One integrated effort studied a farm family as they learned skills for better managing hazardous farm practices. Research studies on tobacco and exposure to sun resulted in programs directed at school age children. The integrative work of this team resulted in rapid development of programming to meet the needs of clientele.

Goal 4

Activity: Natural Resources Management and Protection

Manure is an ideal fertilizer for cropland, but requires proper management to keep its nutrients from polluting ground water and surface water. Numerous research efforts have provided the basis for developing recommendations for comprehensive nutrient management plans. A University of Nebraska Cooperative Extension pilot program is helping producers and advisors develop state-required comprehensive nutrient management plans. Approximately 100 farmers and agricultural professionals participated in an educational program in 2001-2002. The research and extension faculty plan to expand the program to a statewide basis soon. Participants say this training helps them better understand, manage and use manure's nutrients to fertilize cropland and protect water quality and attain compliance with state and federal regulation. A survey found 78 of 2001's participants said they could develop a management plan after finishing the program and using the workbook.

Activity: Environmental Protection

In the Central Platte Valley Nebraska, intensive production of row crops under irrigation and fertilization for many years has resulted in high nitrate-nitrogen levels in the shallow ground-water aquifer. A major USDA grant funded Agricultural Research Division and USDA Agricultural Research Service to study irrigation and nitrogen management methods to reduce the movement of nitrogen into the groundwater. Management practices were developed which have significantly reduced the fertilizer movement to

groundwater. Education efforts by the Cooperative Extension Division have been used to transfer this information to area producers which has resulted in both reduction in the level of irrig ation water application and nitrogen application over large areas. Several faculty involved in this project have joint extension and research appointments.

Activity: Environmental and Natural Resources Policy

Two examples of integrated program efforts in this area address water policy and livestock manure management. Research analysis of water policy alternatives provides the basis for educational programming and publications. This educational effort often provides input for policy makers. Resea rch efforts on livestock manure management issues have provided input to the Nebraska Department of Environmental Quality as they develop regulations. Legal research has provided assistance to counties as they develop zoning policies to address livestock issues and assisted with educational programs targeting livestock producers. This is an ongoing effort.

Goal 5

Activity: Family Strengths

The research and extension program activity in Family Strengths is an ongoing effort with the leadership provided by members of the Sustainable Families Action Team. This team which coordinates programming has faculty with joint research and extension appointments in areas related to families. A significant component of this program is based on the family strength s research which has been developed into application based programs. Building on the six strengths of families research a month long statewide promotion was completed to promote the importance of families, workshops, web based educational information. The integrative work of research and extension has made this a successful program effort.

Activity: Family Housing

A faculty member with joint Agricultural Research Division and Cooperative Extension Division appointment works with the impacts of environmental disclosure policies and constraints on housing transaction practices. Both federal and Nebraska environmental regulations and policies impact existing housing environmental conditions and transactions an d the property values as residential property changes owners. A journal article, "Effects of Constraints on Household Recycling Practices in a Five - State Area," was completed and accepted for publication in 2000. Results of this and other associated research are incorporated directly into extension programing with this faculty member. The faculty member also participates in a multistate research project related to family housing.

Activity: Telecommunications for Rural Areas

Unless rural residents understand and harness information technology, rural communities risk being left out of the information technology revolution. To help prepare and position rural communities to make the most of the Internet, research and extension program activities are working to support rural communities sustain and thrive in a competitive economic environment. Leadership for this effort is provided by members of the Community Resource Development Action Team. This team which coordinates programming has faculty with joint re search and extension appointments in areas related to community development and technology. One large component of this program is built upon the research of assets of rural communities. Target populations are community leaders and businesses located in rural areas. This effort aims to position rural Nebraskans to make the most of technology to enhance community, businesses, educational and government operations.

Activity: Community Strengths

A study examines the effects of Meat packing on both new and longer-term residents of small, Nebraska towns. Interviews conducted by researchers in both Spanish and English measured perception and changes in perception on such subjects as housing, education and health care. After one year of research findings are still preliminary. One of the things that is believed by the researchers is that there are more similarities among Latinos and Caucasians than differences. This was a collaborative effort of between research and extension. Extension helped facilitate int roductions and arrangements for the study completed by University of Nebraska researchers.