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

2002 Annual Report
PLAN OF WORK
University of Nebraska Agricultural Research Division

INTRODUCTION

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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 Natural Resources.

This annual report describes the Agricultural Research Division program impacts and accomplishments for fiscal year 2002 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 2002, Agricultural Research Division expenditures in support of the programs described in this plan totaled $66,072,325. Of this amount, Federal Formula Funds provided $3,507,968 or 5.3% of the total funds expended.

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Darrell W. Nelson, Dean and Director
Agricultural Research Division

2002 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.

University of Nebraska animal scientists studied the feasibility and economics of using dry ethanol byproducts, instead of hay as a protein-energy supplement for cows and heifers in forage based operations. Dried byproducts proved effective and economical. Using byproducts in dry instead of wet form is more practical for ranches and farms because they are easier to transport and feed and don't spoil as fast as wet byproducts, which are well-suited to and widely used in Nebraska feedlots. This research showed that feeding dried byproducts as a protein-energy supplement to heifers on a winter range could save an average of 20%, or more than $12 per head compared to feeding hay. On a typical family operation with around 400 head of cattle, that potential savings translates to more than $4,800 per year; or an average of $10 million statewide if all Nebraska cattle on rangeland were fed dry ethanol byproducts.

Research conducted by Nebraska weed scientists has been used to help develop and calibrate WeedSOFT software. This weed management decision-making tool is improved and expanded annually as new research results are incorporated. WeedSOFT is helping producers reduce crop herbicide use and associated costs, improve weed management and reduce weed related yield losses. A survey of WeedSOFT users in six states indicated that this software is responsible for about $13 million annually in cost savings and increased earnings for crop producers.

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 2002 Expenditures ($ x 1000)	$2,385	$19,742	$22,801	$44,928
Faculty SYs in FY 2002 - 77.9				

* 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: Agricultural Profitability

Impact Statement: *Dry Ethanol Byproducts for Farms and Ranches*

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

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 these new cuts is rooted in land grant university research.

What has been done?

University of Nebraska animal scientists studied the feasibility and economics of using dry ethanol byproducts instead of hay as a protein-energy supplement for cows and heifers in forage-based operations. Dried byproducts proved effective and economical. Using byproducts in dry instead of wet form is more practical for ranches and farms because they are easier to transport and feed and don't spoil as fast as wet byproducts, which are well-suited to and widely used in Nebraska feedlots.

Impact:

This research showed that feeding dried byproducts as a protein-energy supplement to heifers on winter range could save an average of 20 percent or more than $12 per head compared to feeding hay. On a typical family operation with around 400 head of cattle, that potential savings translates to more than $4,800 per year or an average of $10 million statewide if all Nebraska cattle on rangeland were fed dry ethanol byproducts.

Funding:
NU Agricultural Research Division
Hatch Act

Scope of Impact: **Regional**

Summary:

The best way for farmers and ranchers to take advantage of economical byproduct feeds from the state's ethanol industry is to use them in dry instead of wet form, NU animal science research shows. While wet byproducts work well for feedlots, researchers found that dried byproducts work best for operations where cows and calf primarily graze. Institute of Agriculture and Natural Resources studies showed that feeding dry byproducts as a protein-energy supplement to heifers on winter range reduced costs about 20 percent or more than $12 per head compared to feeding hay. On a typical family operation with around 400 head of cattle, that potential savings translates to about $4,800 per year or an average of $10 million statewide if all Nebraska cattle on range land were fed dry byproducts.

Category: **Competitive Agricultural Systems in a Global Economy**
Greater Harmony Between Agriculture and the Environment

Key Theme: ***Agricultural Profitability***

Impact Statement: WeedSOFT Aids Weed Management Decisions

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

Issue:

Deciding how, when or whether to treat weeds in crops is challenging. Farmers must consider economic, environmental and regulatory factors along with the crop and weed situation in that particular field.

What has been done?

To help growers, crop consultants and Cooperative Extension educators make better weed management decisions, University of Nebraska agronomists developed WeedSOFT software. This weed management decision-making tool incorporates NU Institute of Agriculture and Natural Resources and other states' research. Software is improved and expanded annually. The latest versions provide comprehensive ecological and economic information on weed management. WeedSOFT was introduced in Nebraska in 1992. Today it is used by at least 560 people in six states. As part of an Integrated Pest Management project to improve weed management and reduce herbicide use, researchers in several states are promoting wider use of this tool in the north central region. State-specific versions of WeedSOFT now are available for Indiana, Illinois, Kansas, Missouri, Wisconsin and Nebraska.

Impact:

WeedSOFT is helping producers reduce crop herbicide use and associated costs, improve weed management and reduce weed-related yield losses. A survey of WeedSOFT users in six states indicated this software is responsible for about $13 million annually in cost savings and increased earnings for crop producers.

Funding:

USDA-CSREES
North Central Regional IPM Project
NU Agricultural Research Division
NU Cooperative Extension
Hatch Act

Scope of Impact: **Regional**

Summary:

Deciding how, when or whether to treat weeds in crops is challenging. WeedSOFT, weed management decision support software developed at NU, helps growers and others make better decisions. This comprehensive weed management tool include economic, environmental and regulatory considerations for all common Nebraska crops. WeedSOFT is helping producers reduce crop herbicide use and associated costs, improve weed management and reduce weed-related yield losses. A survey of WeedSOFT users indicated this software is responsible for about $13 million annually in cost savings and increased earnings for crop producers. Adapted versions of WeedSOFT also now are used in five other states.

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 focus 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 production 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.

University of Nebraska food scientists are probing genetic differences they discovered in strains of *E. coli* 0157:H7, the culprit in food-borne illness. The Institute of Agriculture and Natural Resources scientists' highly detailed genetic finger printing method helped them identify distinct U. S. subpopulations of *E. coli* 0157:H7. Studies suggest that the most common 0157:H7 strain cattle may not be capable of causing disease in humans or may not be readily transmissible to humans through contaminated beef. This test will help explore the theory that some strains are more virulent than others. They have also developed genetic markers for each subpopulation and are developing a rapid test for distinguishing different populations. Eventually the research should help trace the source of *E. coli*-related illnesses and increase understanding about how production practices influence different *E. coli* strains.

Goal II Resources

Source of Funds	Federal Formula *	State	All other sources	Total
FY 2002 Expenditures ($ x 1000)	$147	$1,219	$1,408	$2,774
Faculty SYs in FY 2002 - 7.2				

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

Impact Statements Related to Federal Goal II - Identified by Key Themes
Category: Safe and Secure Food and Fiber Systems
Key Theme: Food Safety
Impact Statement: *E. coli* Genetic Differences
(Relates to Nebraska Subgoal 1, Output Indicator 1, and Outcome Indicators 1 & 2)
Issue:

Potentially deadly *E. coli* 0157:H7 bacteria is a human health concern, but genetic differences among 0157:H7 populations and their role in causing disease aren't well understood.

What has been done?

Food scientists at the University of Nebraska Institute of Agriculture and Natural Resources developed a highly detailed genetic fingerprinting method and used it to identify distinct subpopulations of *E. coli* 0157:H7 in the United States. Studies of U.S. cattle and human strains suggest that the most common 0157:H7 strain in cattle may not be capable of causing disease in humans or may not be readily transmissible to humans through contaminated beef. Researchers also have identified genetic markers for each subpopulation and are developing a rapid test for distinguishing different populations. This test will help them explore their theory that some strains are more virulent, or more capable of causing human illness, than others.

Impact:

Identifying and tracking genetically distinct *E. coli* 0157:H7 populations could answer key questions about which strains are likely to cause human illness and how people are most likely exposed to these. Rapid tests the team is developing to distinguish these strains also will help other labs quickly detect differences. Eventually, this research should help trace the source of *E. coli*-related illnesses and increase understanding about how production practices influence different *E. coli* strains.

Funding:

USDA National Research Initiative competitive grant
Nebraska Legislative Bill 1206
American Meat Institute
Hatch Act
NU Agricultural Research Division

Scope of Impact: National
Summary:

University of Nebraska food scientists are probing genetic differences they discovered in strains of *E. coli* 0157:H7, the culprit in food-borne illness. The Institute of Agriculture and Natural Resources scientists' highly detailed genetic fingerprinting method helped them identify distinct U. S. subpopulations of *E. coli* 0157:H7. Studies suggest that the most common 0157:H7 strain cattle may not be capable of causing disease in humans or may not be readily transmissible to humans through contaminated beef. This test will help them explore the theory that some strains are more virulent, or more capable of causing human illness, than others. They'll make it available for other labs to use. This research eventually could help identify which *E. coli* strains are likely culprits in human illness and how people are mostly likely exposed to them.

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.

A University of Nebraska nutrition scientist is collaborating on an eleven-state study to understand why young adults eat so few fruits and vegetables and how to change these behaviors. Her preliminary research identified the best methods for reaching young adults with nutrition information. Researchers use these findings to develop new, customized approaches to encourage young adults to improve their habits. Educations materials are customized for young adult, who have the least healthy diets. This customized approach should be the basis of more effective nutrition education efforts for young adults as well as other groups and individuals.

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 2002 Expenditures ($ x 1000)	$77	$639	$738	$1,454
Faculty SYs in FY 2002 - 4.8				

* 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: Improving Young Adults Eating Habits

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

Issue:

Most young adults eat a pretty lousy diet. Their meals fall far short on fruits and vegetables at a time when they're starting on their own and establishing eating habits that often last a lifetime.

What has been done?

A University of Nebraska nutrition scientist is collaborating on an 11-state study to understand why young adults eat so few fruits and veggies and how to change these behaviors. Her preliminary research identified the best methods for reaching young adults with nutrition information. Researchers used these findings to develop new, customized approaches to encourage young adults to improve their habits. They developed newsletters, manuals and other information tailored to different stages of readiness to change and are testing them nationwide. This research will be the foundation for a broader national nutrition campaign targeting other groups and individuals.

Impact:

Experience shows that one-size-fits-all campaigns to change behavior don't work because people go through stages in their willingness to change. Developing information that nutrition educators can match to an individual's stage of change should increase the chances of improving their eating habits for the long-term.

Funding:

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

Scope of Impact: National

Summary:

When it comes to changing someone's eating habits, a one-size approach often fails. That's because people go through phases in their willingness to change. An NU nutrition scientist is working on multi-state research that has developed and is testing newsletters, manuals and other educational information tailored to different phases of change. These materials are customized for young adults, who have among the least healthy diets and eat the fewest fruits and vegetables. This customized approach should be the basis of more effective nutrition education efforts targeting young adults. It also will be the foundation for broader national nutrition campaigns targeting other groups and individuals.

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.

Buffer strips are the focus of numerous federal, state and local water quality efforts. University of Nebraska researchers have developed a simple, accurate sampling device that measures water flow into and out of buffers so that performance can be assessed in the field. Their sampler captures a tiny but representative faction of the water flowing through the buffer. Lab analysis of the sample reveals how effective the strip is at keeping contaminants from streams. While this sampler is designed for use by researchers, a simpler version is also being developed for natural resources and conservation agencies.

University of Nebraska scientists are studding the interaction between agriculture and surface water to develop a model lake classification system suited to agricultural areas. They've sampled more than 250 Nebraska lakes and reservoirs and are developing computer models to compare current and historic water quality to develop tools to more accurately assess water quality. Finding ways to remotely monitor water quality instead of sampling water at each lake is a major goal. When perfected, measurements could be made from an airplane or satellite. Ultimately, their system should help better protect and maintain lake water quality in agricultural regions.

In the 1990's, insecticides used to control western corn rootworms began to fail in some central Nebraska counties. This major corn pest had become resistent to a common adult rootworm insecticide. A University of Nebraska scientist has helped farmers identify alternatives to adult control, mapped the extent and spread of resistance, and encouraged practices to limit further resistance development. Research also identified the biochemical and genetic mechanism for organophosphate resistance and how resistance is inherited. NU researchers are applying these findings to a computer model that simulates field conditions and predicts how long a rootworm control will be effective based on factors such as management and cropping practices. A computer model should provide more accurate predictions of the outcome of specific management approaches and improved decisions about how to use these tools.

Goal IV **Resources**

Source of Funds	Federal Formula *	State	All other sources	Total
FY 2002 Expenditures ($ x 1000)	$803	$6,649	$7,679	$15,131
Faculty SYs in FY 2002 - 32.2				

* 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: Riparian Management

Impact Statement: Buffer strip assessment tool

(Relates to Nebraska Subgoal 1, Output Indicator 6, and Outcome Indicator 3)

Issue:

Strips of vegetation between crop fields and streams filter sediment and chemical runoff to protect waterways from pollution. While their water quality protection value is well recognized, there has been no practical way to measure buffer strip performance under real-world conditions.

What has been done?

University of Nebraska researchers have developed a simple, accurate sampling device that measures water flow into and out of buffers so that performance can be assessed in the field. Their sampler captures a tiny but representative fraction of the water flowing through the buffer. Lab analysis of the sample reveals how effective the strip is at keeping contaminants from streams. This devise will help other researchers more accurately assess buffer strip design and construction. A simpler version is being developed for natural resources and conservation agencies to use.

Impact:

Buffer strips are the focus of numerous federal, state and local water quality protection efforts. This in-field sampler will lead to more accurate buffer strip evaluation under Great Plains growing conditions. This should result in better buffer strip design and construction.

Funding:

NU Agricultural Research Division
USDA National Agroforestry Center
Hatch Act
Nebraska Corn Board

Scope of Impact: National

Summary:

Vegetative buffer strips between crop fields and streams filter sediment and chemical runoff to protect water quality. Buffer strips are key to many surface water protect efforts yet there has been no practical way to measure their performance under real-world conditions. NU Institute of Agriculture and Natural Resources engineers have devised a simple, accurate tool to evaluate buffer strip's effectiveness in the field. Their device takes a tiny but representative water sample that is analyzed to learn how well the buffer strip is performing. This device is designed for use by researchers. A simpler version is being developed for natural resources and conservation agencies. Both will help more accurately evaluate buffer strip design and construction, which should lead to better buffer designs.

Category: Greater Harmony Between Agriculture and the Environment
Key Theme: Water Quality
Impact Statement: Monitoring Lake Water Quality
(Relates to Nebraska Subgoal 2, Output Indicators 2 & 6, and Outcome Indicator 1)

Issue:

Agriculture is the dominant influence on lakes and reservoirs in Nebraska. However, most national criteria used to monitor and classify lake water quality weren't designed with agriculture areas in mind.

What has been done?

University of Nebraska scientists are studying the interaction between agriculture and surface water to develop a model lake classification system suited to agricultural areas. They've sampled more than 250 Nebraska lakes and reservoirs and are developing computer models to compare current and historical water quality to develop tools to more accurately assess water quality. Finding ways to remotely monitor water quality instead of sampling water at each lake is a major goal. Researchers are developing "spectral signatures" of the lakes using equipment that measures algae concentrations based on reflected light patterns. The extent of algae blooms help indicate a lake's nutrient levels and water quality. When perfected, measurements could be made from an airplane or satellite.

Impact:

Developing research-based tools to classify and monitor lakes and reservoirs in agricultural areas should help natural resources and environmental agencies protect water quality and determine which are the best candidates for restoration. Remote sensing of water quality should make monitoring easier and less expensive.

Funding:

U.S. Environmental Protection Agency
Nebraska Department of Environmental Quality
NU Agricultural Research Division
Hatch Act

Scope of Impact: **National**

Summary:

NU scientists are studying the interaction of agriculture and surface water to develop a lake classification and water quality monitoring system suitable for agricultural areas. They've sampled more than 250 Nebraska lakes and reservoirs and are developing computer models to compare current and historical water quality to develop tools to more accurately assess water quality. They're also working on ways to remotely monitor water quality instead of sampling water at each lake to save time and money. Ultimately, their system should help better protect and maintain lake water quality in agricultural regions.

Category: Greater Harmony Between Agriculture and the Environment
Key Theme: Sustainable Agriculture
Impact Statement: Learning from Rootworm Resistance
(Relates to Nebraska Subgoal 1, Output Indicator 2 , and Outcome Indicator 3)

Issue:

In the 1990s, insecticides used to control western corn rootworms began to fail in some central Nebraska counties. This major corn pest had become resistant to a common adult rootworm insecticide. University of Nebraska entomologists have extensively studied this problem to preserve the effectiveness of future insect-fighting technologies.

What has been done?

NU scientists helped farmers identify alternatives to adult control, mapped the extent and spread of resistance, and encouraged practices to limit further development. Researchers also identified the biochemical and genetic mechanism for organophosphate resistance and how resistance is inherited, and developed a test to check beetles for resistance. In collaboration with a Mississippi State computer modeling specialist, NU researchers are applying these findings to a computer model that simulates field conditions and predicts how long a rootworm control will be effective based on factors such as management and cropping practices. They have verified the model's accuracy by comparing it to what happened with resistance in Nebraska. They're also working with University of Maryland scientists to map genes associated with resistance.

Impact:

What NU scientists have learned from Nebraska's rootworm resistance should help regulators, industry and producers preserve the effectiveness of new insect control tools, such as Bt corn for rootworms and other new, more environmentally friendly technologies. The computer model should provide more accurate predictions of the outcome of specific management approaches and improve decisions about how to use these tools.

Funding:

USDA
NU Agricultural Research Division
Hatch Act

Scope of Impact: **Regional**

Summary:

In the 1990s, insecticides to control western corn rootworm began to fail in parts of Nebraska. This major pest had become resistant to a common adult rootworm insecticide. NU entomologists are working to prevent similar problems in the future. Institute of Agriculture and Natural Resources scientists have extensively studied rootworm resistance to organophosphate insecticide in the field and the lab. They've learned a great deal about the biochemical and genetic mechanisms of resistance. In collaboration with Mississippi State, they are incorporating their findings into a computer model that simulates field conditions and predicts whether resistance develops based on factors such as management and cropping practices. Their goal is to identify ways to preserve the effectiveness of new insect control tools, such as Bt corn for rootworms and other environmentally friendly technologies.

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.

State and federal public policy decisions are often made with little understanding of their impact on rural people. To provide objective information on rural Nebraskans views and concerns, the University of Nebraska rural sociologist launched the Nebraska Rural Poll in 1996. This scientific poll annually surveys 7,000 randomly selected residents in the state's 87 rural counties on issues related to public policy, community, work and quality of life. Results are analyzed and shared with state and federal lawmakers, decision-makers, the public and communities. In addition to a set of standing questions, researchers ask a few different questions each year that address emerging issues, such as taxation, farm policy or school consolidation. Results over time also track trends and changes for rural Nebraskans and provide a rural perspective for policy discussions.

Goal V **Resources**

Source of Funds	Federal Formula *	State	All other sources	Total
FY 2002 Expenditures ($ x 1000)	$95	$785	$905	$1,785
Faculty SYs in FY 2002 - 10.0				

* 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: Nebraska Rural Poll Provides Rural Perspective

(Relates to Nebraska subgoal 3, Output Indicators 7 & 8, and Outcome Indicator 4)

Issue:

State and federal public policy decisions often are made with little understanding of their impact on rural people.

What has been done?

To provide objective information on rural Nebraskans views and concerns, a University of Nebraska rural sociologist launched the Nebraska Rural Poll in 1996. The scientific poll annually surveys 7,000 randomly selected residents in the state's 87 rural counties on issues related to public policy, community, work and quality of life. Results are analyzed and shared with state and federal lawmakers, decision-makers, the public and communities. In addition to a set of standing questions, researchers ask a few different questions each year that address pressing issues, such as taxation, farm policy or school consolidation. Results of rotating questions provide rapid feedback to decision-makers on these issues. Results over time also track trends and changes for rural Nebraskans and provide a rural perspective for policy discussions.

Impact:

This poll provides objective information about the needs and concerns of rural Nebraska. Decision-makers now use Nebraska Rural Poll results in policy decisions. Results have been included in testimony before several legislative hearings and policy-makers say this information helps them make more informed decisions.

Nebraska Gov. Mike Johanns said: "As governor, I believe it is vital to stay in touch with the issues important to citizens in all parts of the state. The information compiled in the Nebraska Rural Poll will be a very useful tool as we make decisions which will affect rural Nebraska."

Chuck Hassebrook, program director for the Center for Rural Affairs said: "The Rural Poll has been invaluable in transcending the babble of voices to show what rural people really want ..."

Funding:

Partnership for Rural Nebraska
NU Cooperative Extension
NU Agricultural Research Division
Hatch Act

Scope of Impact: Multistate

Summary:

Policy-makers and community leaders have a better understanding of rural Nebraska concerns and opinions, thanks to the Nebraska Rural Poll. Launched in 1995 by an NU Institute of Agriculture and Natural Resources rural sociologist, the annual poll asks rural people's views on work, community, quality of life and public policy issues. Researchers quickly analyze and share results widely with state and federal lawmakers, decision-makers, the public and communities. This poll helps track trends and changes in rural Nebraska and provides a rural perspective for policy discussions. Decision-makers say this objective information helps them make better informed policy choices.

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. 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 2002 Annual Progress Report for the Cooperative Extension Division will impact Agriculture Research Division planning.

a) Actions Taken to Seek Stakeholder Input

In 2002, planning was initiated for comprehensive statewide IANR stakeholder Listening/Strategic Planning sessions to be held in 2003. Twenty-five sessions have been scheduled throughout the state. While open to the general public, special invitation lists have been developed for each location to help encourage diverse participation, including under-served groups. These sessions will provide the initial input for development of a new five-year strategic plan for IANR and the Agricultural Research Division.

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 meet twice annually. 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 several times. 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 2002, 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 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 decisions 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 new five-year IANR Strategic Plan to be developed in 2003 will be important in setting new program directions and new staffing plans.

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. A list of current ARD participation in multistate committees and the related federal goals is attached as Appendix 1.

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 fact 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	$789,573	$789,573	$789,573
Goal 2:	Pre and Post Harvest Plant and Animal Food Safety Food Processing and Food Service Management Food Safety	$113,754	$81,427	$61,439	$61,439	$61,439
Goal 3:	Human Nutrition, Health and Safety Health Care	$21,645	$8,375	$16,052	$16,052	$16,052
Goal 4:	Natural Resources Management and Protection Environmental protection Environmental and Natural Resources Policy	$182,627	$299,047	$339,003	$339,003	$339,003
Goal 5:	Family Strengths Family Housing Telecommunications for Rural Areas Community Strengths	$130,934	$64,030	$40,727	$40,727	$40,727
Total		$1,011,840	$1,086,702	$1,246,794	$1,246,794	$1,246,794

_____ _____
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

A new industry based on chicory is emerging in Nebraska's Panhandle, which now boosts the nation's only chicory processing plant.

Chicory's development as a new Nebraska crop is based largely on research by agricultural scientists at NU's Panhandle Research and Extension Center at Scottsbluff. Since 1995, IANR researchers and extension specialists have studied chicory's potential.

Chicory is a root crop that is used as a pet food ingredient. It's widely grown in Europe but not in the United States.

IANR research determined how best to plant, tend and harvest chicory. It showed it could be profitably grown in the region and found that western Nebraska can produce chicory that meets or exceeds the best grown in Europe. The IANR team worked with area farmers and businesses to help establish a fledgling chicory industry.

In fall 2001, U.S. Chicory, a private company, opened a chicory processing plant, the first in the Americas. The plant processed 950 acres of chicory grown by four farmers and IANR researchers in 2001 and again in 2002.

The $2 million plant employed 25-30 people when it opened. Employment is expected to grow 50 to 75 people when the plant reaches capacity within four years. Panhandle chicory production is expected to increase to 5,000 acres by 2003 with the potential for 10,000 acres by 2005. Yields average 19 tons of root per acre and bring about $55 per ton. If 10,000 acres were planted, growers would gross about $10 million.

Activity: Integrated Livestock Management

Contrary to popular belief, staying put is best for feeder pigs in a wean-to-finish operation. For producers, this saves time and might improve profits.

Variations in pig weight can increase the time needed to get pens of pigs to market weight and can hurt sale prices. To combat this problem, many producers overstock pens at weaning, remove the lightest pigs from a pen about three weeks later and remix them with other lightweight pigs in hopes of enhancing performance.

Research by an IANR animal scientist at the Northeast Research and Extension Center showed

it’s best to leave the pigs in the same pens.

He found that moving and remixing lightweight pigs doesn’t improve performance or decrease variation in pig weight at slaughter.

Results show that even though a pig may be smaller than the rest of the pigs in the pen, pigs are better off staying with their penmates. Removing and mixing also had no effect on daily gain, feed intake or carcass characteristics.

These research results are already incorporated into extension education programs and are being shared with producers in a variety of ways, including field days, news releases, and special program events.

Activity: Integrated Pest Management

Its purple flowers look innocent enough but purple loosestrife is silently killing thousands of Midwestern waterways and wetlands. This invasive weed offers no value to wildlife, interrupts fishing due to its thick plant growth above and below the water's surface and chokes out native vegetation.

An estimated 15,000 acres in Nebraska are already lost to this plant, mostly along the main rivers and waterways. Integrated management approaches to stop this noxious weed's spread, including mowing, disking, biocontrols and herbicides are being studied.

The research has shown that a combination of herbicides and introducing loosestrife's natural enemy, the galerucella beetle, appears to be the most effective approach. The research effort has included working with county weed superintendents to gather and assess information to find the best integrated approach for combating the weed.

The first extension education efforts had the objective of creating a public awareness of the purple loosestrife problem. These efforts included media releases and public seminars. The seminars targeted county noxious weed authorities, crop consultants, Nebraska Game and Parks Commission staff, USDA-NRCS employees, extension educators and key ranchers and farmers.

The research effort continues and control strategies are starting to be implemented. It is expected that purple loosestrife will not be completely eliminated, but the research and education efforts should enable its reduction to acceptable levels.

Activity: Sustainable Agriculture Production Systems

The North Central Initiative for Small Farm Profitability is a four-state, multi-institutional effort designed to improve the profitability and competitiveness of small and mid-size farms in the Midwest. Partners in the USDA funded project include Iowa State University, University of Wisconsin, University of Missouri, University of Nebraska-Lincoln, Center for Rural Affairs, Michael Fields Agricultural Institute, and Practical Farmers of Iowa. Key to the initiative are producer clusters working with researchers to put science-based, market-driven results into action.

More than 30 producer clusters have been formed, including 11 in Nebraska, to provide practicality and relevance to the initiative's objective of increasing farm profitability. Cluster members are working on everything from direct marketing of meats and vegetables to exploring the profitability of raising grapes, nuts, and fish.

Faculty in the four states, ranging from food scientists to ag economists to sociologists, are working as teams with these farmers. Market research is an integral part of the initiative. The team has completed 32 case studies.
Recent results highlighted the potential for supplying locally grown wheat and barley to craft breweries, producing specialty cheeses or selling locally grown food to groceries, restaurants and consumers. This effort is providing small producers with market research and other information traditionally available only to bigger businesses at high cost. Producers are using this information in their value-added businesses to improve their changes of success. For example, technical assistance from the initiative helped a Sutherland producer group become licensed for pepper processing and led to creation of a Web site advertising the product.

Goal 2

Activity: Pre and Post Harvest Plant and Animal Food Safety

Beneficial bacteria might help reduce dreaded *E. coli* 0157:H7 in feedlot cattle.

IANR research shows that selected strains of *Lactobacillus acidophilus*, a bacteria commonly used in yogurt, are promising as feed additives to reduce 0157:H7's prevalence. This research is part of ongoing IANR efforts to identify specific strategies producers can use to limit *E. coli* in feedlot cattle before they enter packing plants.

The idea is that *Lactobacillus* gets ingested with rations and travels to the cattle's intestines where it kills *E. coli*. If further studies prove it's effective, producers might add *Lactobacillus* to feed to reduce *E. coli* in feeder cattle.

In a large 2001 IANR feedlot study, *Lactobacillus* reduced *E. coli* in manure 61 percent, compared with cattle that didn't receive the additive. *Lactobacillus* proved somewhat less effective in summer 2002 feedlot trials although IANR scientists say it still has potential as an *E. coli* reduction tool.

In the 2002 trials, the team tested the effectiveness of an experimental vaccine developed by Canadian scientists as well as the *Lactobacillus.* Early results indicate a combination of the vaccine and a *Lactobacillus* feed additive was most effective. The combination's effect was cumulative.

Because 0157:H7 is common in feedlots, eliminating it isn't likely. Reducing its prevalence at key times, such as before slaughter, is more realistic.

This team effort includes several faculty with joint research and extension appointments. As the study findings are made public, they are rapidly included in extension programming in the food safety area.

Activity: Food Processing and Food Service Management Food Safety

The food allergy research and resource program confidential analytical service was implemented to assist the food industry, regulatory agencies, physicians, and consumers in analyzing food samples for undeclared, potentially hazardous residues of allergenic foods and evaluating cleaning strategies and procedures for cleaning food-processing equipment to remove allergenic food residues.

The objective is protection of the food-allergic consumer (primarily small children) from potentially life-threatening reactions to food products. Food companies and regulatory agencies used the data obtained from the program to make decisions about the safety of food products for food-allergic consumers and the efficiency of food industry equipment cleaning practices. Regulatory agencies used the information to make regulatory decisions on foods that were out of compliance and posed a threat the health of food-allergic consumers. Physicians and food-allergic consumers used the information gained through this program to find out if the food they suspected of causing a reaction did, allowing them to go forward to regulatory agencies with a complaint after a severe reaction.

In September of 2002, this program had 44 food companies, 2 physicians, 3 consumers, and 2 regulatory agencies participate. Of the food companies, approximately 22 of the 44 contacted the program for further information and follow-up on allergen control strategies. Educational delivery was by written report and phone consultation. The subject of the written reports and phone consultation was results of analysis for residues of allergenic foods in food products and on equipment surfaces.

The food companies who participated in this ongoing research and extension program changed the way they cleaned equipment and also how they made food; also, receiving information from this program saved an estimated $440,000 in potential recall costs and unknown amounts of potential lawsuit payouts from consumer reactions.

Goal 3

Activities: Human Nutrition and Value-added Agriculture

Society continues to become more health conscious and a segment of the population seeks food alternatives to be sure that they are consuming the most nutritious and healthy diet possible. In addition, livestock producers are seeking niche markets that can be value-added in terms of improving profitability. One of those possible niche markets is grass-fed beef and bison; this potential market is based on possible health benefits from consuming meat from grass-fed animals . The general public knows little about the nutritional content of bison meat. Research was conducted collaboratively by the University of Nebraska and North Dakota State University to determine the nutrient content of bison.

This work has shown that bison is high in protein, low in fat, and relatively low in calories. Comparison of grass-fed and grain-fed bison meat has shown that only minimal differences exist in nutrient content with the primary exception of the fatty acid profile. Limited nutrient content testing of ground beef samples from grass-fed and grain-fed steers in a non-controlled study indicated that differences in nutrient content may exist between grass-fed and grain-fed beef steers, indicating that a valid scientific study, with a testable hypothesis, should now be tested.

A consumer sensory evaluation and value study was conducted to further the evaluate the market potential of grass-fed beef. The data from this study indicated that most consumers feel that grass-fed beef is less desirable than grain-fed beef. However, it is recognized that a small niche market for grass-fed beef does exist. The information generated by these efforts was a part of an extension workshop for livestock producers to consider "The Future For Grass-Finished Foods." and other extension educational activity. The bison nutrient information has been published in extension publications and also presented at extension workshops.

Goal 4

Activity: Natural Resources Management and Protection

Shrubs that produce woody decorative florals could pose a win-win situation for landowners or agricultural producers who grow them. As live plants along streambanks, they reduce soil erosion and keep waters cleaner. When harvested, they have commercial value beautifying the home or office.

Approximately 45 woody plant species are being evaluated as a component of riparian buffer strips along with grasses and other vegetation planted in narrow bands along waterways. The buffer strips trap sediment pesticides and other possible contaminants preventing them from entering surface water supplies.

Initial research indicates that the stream-side buffers may possibly reduce sedimentation 50 to 90 percent. The research effort is also serving as an extension demonstration effort to show that the woody florals have value in the floral and craft markets. The woody shrubs grow quickly and could potentially add $5,000 to $15,000 to a family's annual income if they are willing to do a month's work of hand harvesting in late fall and early winter and then market the fresh product to wholesale or retail florists.

Activity: Environmental Protection

Careful nitrogen management and the right technology can help farmers protect groundwater from excessive nitrate contamination, which is a concern for private and municipal drinking water wells.

Center pivot irrigation systems are a key part of that water management equation, a six-year NU study found.

An IANR research and extension team compared nitrate-nitrogen levels in shallow groundwater under test fields irrigated with surge, conventional furrow irrigation or center pivots.

This research found that nitrate levels were consistently lower under center pivot-irrigated fields. These findings are especially significant in Nebraska, which has more than 7 million irrigated acres, two-thirds of which are irrigated with center pivots.

Compared with the furrow-irrigated field, the surge-irrigated field received 60 percent less water and 31 percent less nitrogen, while the center pivot field used 66 percent less water and 37 percent less nitrogen. Although the surge-irrigated field received almost as much water as the pivot field, surge didn't limit nitrate contamination nearly as well.

Researchers found that the best way to limit nitrate leaching into groundwater is by controlling water use and spoon-feeding nitrogen fertilizer to crops through a center pivot.

This research showed that center pivots combined with careful management can help keep groundwater nitrate levels at or near 10 parts per million, the federal maximum for drinking water, without significantly compromising crop yields.

Activity: Environmental and Natural Resources Policy

Faculty members with both extension and research appointments are working as a team to adapt and provide a science-based "Nebraska Odor Footprint Tool" to communities, producers, and regulators with which to address the issue of odors from livestock facilities.

Selection of strategic locations for livestock operations and quantifying the effectiveness of odor control technologies using this tool will enable livestock production systems to co-exist in rural communities and thus provide a steady market for corn and corn by-products.

The goals of this project are to develop an odor footprint tool that: (a) identifies the extent of areas impacted by odors from existing and expanding livestock operations, and (b) evaluates the impact of odor control technologies on odor dispersion in rural communities.

The project involves three tasks: (a) incorporation of Nebraska meteorology and odor source specifications into the footprint tool; (b) calibration of the tool using rural community odor panels and; (c) delivery of an educational program on use of the tool for determining separation distances according to various levels of community tolerance to odors from different sizes and types of livestock facilities.

Maintaining and enhancing sustainable livestock operations in rural communities is vital to ensuring a continued domestic livestock feed market for corn. A reversal of the decline in swine numbers back to 1992 levels would return 37 million bushels to Nebraska's corn grind. Increasing beef cattle numbers by just 10 percent would add another 28 million bushels to that amount. The odor planning tool developed in this project not only addresses the sustainability of the livestock industry in rural communities, but contributes to sustaining and increasing the market for corn on a local basis. While developed for Nebraska conditions, the procedures and protocols will be applicable to all the states in the Corn Belt.

Goal 5

Activity: Family Strengths

Rural Nebraska Welfare to Work families are faced with multiple personal and family challenges that makes it difficult for them to successfully secure and continue employment while maintaining their family. These challenges include lack of adequate transportation, child care and support systems plus issues related to mental and physical health of those they are responsible for as well as themselves. In rural Nebraska fewer resources for family management/life skills education are available to Employment First participants during the transition and early stages of self-sufficiency. This was all confirmed in a recently completed evaluation of Nebraska's Employment First Welfare Reform Program conducted by Mathematica Policy Research, Inc.

Building Nebraska Families (BNF) is an intensive, education-based developmental program focused on helping the hard to employ, rural clients of the Nebraska Health and Human Services System (HHSS) Employment First (EF) Program.

Employing a family strengths model based on the research of Drs. John DeFrain and Nick Stinnett, each individual participant, with input from HHSS case managers and the Extension

Educators, selects educational topics from a flexible list. Using research-based materials, the Extension Educators teach from the following areas: anger/conflict management, child development, coping skills, communication skills, decision making, goal setting, healthy relationships, household management, money management, nutrition/food skills, parenting, personal life skills development (character and family strengths development), problem solving, self-esteem, setting healthy boundaries, stress management, and time management. Participants are encouraged to complete assignments based on lesson topics and then apply what they have learned. Using a community network model, BNF encourages participants to volunteer in order to engage the entire community (residents, businesses, education, spiritual, cultural, etc.) in their educational process which promotes a give and take relationship.

Extension Educators work with participants until they become employed and continue to provide supportive services for up to six months or until the participant is no longer receiving a TANF grant.

Activity: Telecommunications for Rural Areas

In an effort to help businesses explore the possibilities information technology holds for them in rural Nebraska, the University of Nebraska-Lincoln Center for Applied Rural Innovation (CARI) has developed the Nebraska Electronic Main Street Program which utilizes a curriculum developed by the University of Minnesota Extension Service. This program is under the management of the conNEcting Nebraska Technology Management Team, consisting of six University of Nebraska Cooperative Extension Staff under the direction of John Allen, University of Nebraska Rural Socioligist and Researcher. The team is responsible for the management of the community based curriculum - marketing, pricing, teaching, training the trainer. In an effort to be more responsive to the needs of Nebraska business owners, a survey of rural Nebraska businesses was conducted to determine their current technology use as well as their future training needs.

This study was funded by the Nebraska Information Technology Commission and was conducted in partnership with the Applied Information Management Institute (AIM). Self-administered questionnaires were mailed to 900 businesses in rural Nebraska. A response rate of 45% was achieved (382 completed responses were received out of the 850 deliverable surveys). The results have been compiled, analyzed and recommendations have been developed. A report entitled Nebraska Business Use of Information Technology was written to detail the results and recommendations.

The results reveal that information technologies are widely used by Nebraska businesses for a variety of business operations. Seventy-nine percent reported using a computer in their business, just over one-half (58%) of the businesses used Internet access, and 31 percent had a Web site. Overall, there were relatively few businesses extensively using many current

applications of Internet technology. However, results show that the businesses expect these applications to be important to the future of their businesses. In addition, 41 percent of the businesses expected to expand or restructure their businesses using information technologies in the future. Most businesses seem eager to learn how to use information technologies in their business. Fifty-six percent said they were interested in learning how to use a computer and other information technology in their business practices.

The businesses expressed a need for a better understanding of how the Internet can benefit their businesses. They also have a desire to learn how to use information technologies in their business practices. Thus, this survey has demonstrated that well designed programs (such as the Nebraska Electronic Main Street program) are greatly needed by rural businesses. It is crucial that business owners have the knowledge of how to use information technologies to remain competitive and expand their market opportunities. The unavailability of this knowledge to support business utilization of Internet technologies poses a serious barrier to the continued adoption and diffusion of information technology among rural businesses.
The results of this survey were used by AIM to develop an advanced training curriculum for rural business owners. This curriculum addresses the needs expressed by business owners in the survey. The conNEcting Nebraska team has adopted this curriculum for their use in training business owners in rural Nebraska how to incorporate technology to run their business operations more efficiently and to expand their markets globally.

Activity: Community Strengths

The Internet someday might provide 21st century rural Americans the shopping choices and convenience that mail order catalogs offered their ancestors a generation earlier. So far, however, University of Nebraska research show rural residents buy mostly at retail stores and are happiest with bricks-and-mortar shopping.

Fewer than 20 percent of the 2,218 rural respondents from 11 states, including Nebraska, use the Internet or television shopping channels to buy food or clothing, according to a survey derived from College of Human Resources and Family Sciences researcher and extension specialist who are studying rural residents' shopping habits.

Findings may help decision makers develop policies regarding electronic commerce and help rural businesses and communities adjust to potential changes in consumers' buying habits.

Survey respondents said they were more satisfied with traditional retail shopping than other forms. They were somewhat satisfied with catalog shopping but were lukewarm toward both Internet and television shopping.

What's behind this reluctance to use other shopping methods? Credit card security and Internet

access are key. More than half of those surveyed had Internet access, although more than 52 percent said they didn't have a personal computer at home. More than 60 percent reported using the Internet once within the last year, but nearly half said they don't use the Internet.

Respondents in larger rural communities tended to feel more comfortable buying over the Internet. They cited availability of brand-name products, quick delivery and feeling safer using the Internet than shopping at malls. More than half the participants surveyed lived in communities of under 10,000 population with 60 percent being women.

Researchers hope to better understand how consumers adapt to electronic shopping. Future research will compare e-commerce shopping trends in metropolitan and non-metropolitan areas.

Appendix I

Multi-State Research Committees with Current Agricultural Research Division Faculty Participation

No.	Title	Participating Unit *	Federal Goal
NC-7	Conservation, Management, Enhancement and Utilization of Plant Genetic Resources	Agro/H PREC	1
NC-94	Impact Climate and Soils on Crop Selection and Management	SNRS	4
NC-100	RRF Administration, Planning and Coordination		NA
NC-107	Evolving Pathogens, Targeted Sequences, and Strategies for Control of Bovine Respiratory Disease	VBS	1
NC-125	Biological Control of Soil- and Residue-borne Plant Pathogens	Plant Path	1
NC-129	Mycotoxins in Cereal Grains	Plant Path	2
NC-131	Molecular Mechanisms Regulating Skeletal Muscle Growth and Differentiation	An Sci	1
NC-136	Improvement of Thermal and Alternative Processes for Foods	IAPC	2
NC-170	Mediating Exposure to Environmental Hazards through Textile Systems	Home Ec	1
NC-189	Forage Protein Characterization and Utilization for Cattle	An Sci	1
NC-202	Characterizing Weed Population Variability for Improved Weed Management Decision Support Systems to Reduce Herbicide Use	Agro/H	3
NC-205	Ecology and Management of European Corn Borer and other Stalk-boring Lepidoptera	NEREC Ent	1
NC-213	Marketing and Delivery of Quality Cereals and Oilseeds	FS&T Agro/H	1
NC-215	Persistence of Heterodera Glycines and other Regionally Important Nematodes	Plant Path PREC	1
NC-218	Assessing Nitrogen Mineralization and other Diagnostic Criteria to Refine Nitrogen Rates for Crops and Minimize Losses	Agro/H	1
NC-219	Using Stage Based Intervention to Increase Fruit and Vegetable Intake in Young Adults	NS&D	3
NC-222	Impact of Technology on Rural Consumer Access to Food and Fiber Products	TCD NS&D	5

No.	Title	Participating Unit *	Federal Goal
NC-223	Rural Low-Income Families: Tracking Their Well-Being and Functioning in the Context of Welfare Reform	FCS	5
NC-224	Competitiveness and Value-Added in the U.S. Grain and Oilseed Industry	Ag Econ	1
NC-225	Improved Grazing Systems for Beef Cattle Production	An Sci	1
NC-226	Development for Pest Management Strategies for Forage Alfalfa Persistence	Ent Agro/H	1
NC-227	Ergot - a New Disease of U. S. Grain Sorghum	Agro/H	1
NC -229-	Porcine Reproductive & Respiratory Syndrome (PRRS): Mechanisms of Disease and Methods for the Detection, Protection and Elimination of PRRS Virus	VBS	1
NC-230	Integrating Biophysical Functions of Riparian Systems with Management Practices and Policies	BSE	4
NC-503	Host Plant Control Resistance to and Best Management Practices for Karnal Bunt of Wheat	Agro/H	1
NC-504	Soybean Rust - A New Pest of Soybean Production	Pant Path	1
NC-1004	Genetic and Functional Genomic Approaches to Improve Production Quality of Pork	An Sci	1
NC-1005	Landscape Ecology of White-tailed Deer in Agro-forest Ecosystems: a Cooperative approach to Support Management	SNRS	4
NC-1006	Methods to Increase Reproductive Efficiency in Cattle	An Sci	1
NC-1007	Enteric Diseases of Swine and Cattle Prevention Control and Food	VBS	1
NC-1119	Management Systems to Improve the Economic and Environmental Sustainability of Dairy Enterprises	An Sci Ag Econ	1
NC-1142	Regulation of Photosynthetic Processes	Biochem	1
NC-1167	N–3 Polyunsaturated Fatty Acids and Human Health and Disease	NS&D	3
NCA-1	Crop Soil Research	Agro/H	NA

No.	Title	Participating Unit *	Federal Goal
NCA-2	Animal Health Advisory Committee	VBS	NA
NCA-4	Horticultural Crops	Agro/H	NA
NCA-5	Human Sciences	Home Ec	NA
NCA-6	Livestock Production	An Sci	NA
NCA-10	Forestry and Forest Products	SNRS	NA
NCA-12	Agricultural Economics	Ag Econ	NA
NCA-14	Plant Pathology	Plant Path	NA
NCA-15	Entomology and Economic Zoology	Ent	NA
NCA-16	Agricultural Engineering	BSE	NA
NCA-22 NCA-25	Food Science and Human Nutrition	FS&T NS&D	NA
NCA-23	Fisheries and Wildlife	SNRS	NA
NCA-24	Agricultural Education Research	AgLEC	NA
NCR-3	Soil Survey	CSD	1
NCR-9	Midwest Plan Service	NEREC BSE	1
NCR-13	Soil Testing and Plant Analysis	Agro/H	1
NCR-22	Small Fruits and Viticulture Research Committee	Agro/H	1
NCR-25	Disease of Corn and Sorghum	Plant Path	1
NCR-31	Ecophysiological Aspects of Forage Management	Agro/H	1
NCR-42	Committee on Swine Nutrition	An Sci	1
NCR-46	Development, Optimization, and Delivery of Management Strategies for Corn Rootworms	Ent	1
NCR-52	Family Economics Committee	FCS	5
NCR-57	Reproductive Physiology	An Sci	1
NCR-59	Soil Organic Matter: Formation, Function, and Management	Agro/H	1
NCR-65	Social Change in the Market Place: Consumer/Retail/Producer Interface	TCD	5
NCR-84	Potato Breeding and Genetics Technical Committee	Agro/H	1

No.	Title	Participating Unit *	Federal Goal
NCR-87	Beef Cow-Calf Nutrition and Management	An Sci	1
NCR-89	Swine Management Research	NEREC An Sci	1
NCR-97	Regulation of Adipose Tissue Accretion in Meat Animals	An Sci	1
NCR-103	Specialized Soil Amendments, Products, Growth Stimulants, and Soil Fertility Management Systems	WCREC Agro/H	1
NCR-125	Biological Control of Arthropod Pests	SCREC Ent	4
NCR-131	Animal Care and Behavior	AnSci	1
NCR-137	Soybean Diseases	Plant Path	4
NCR-148	Migration and Dispersal of Agriculturally Important Biotic	Ent	1
NCR-167	North Central Regional Corn Breeding Research Committee	Agro/H	1
NCR-170	Research Advances in Agricultural Statisticians	Biometry	1
NCR-174	Synchrotron X-ray Sources in Soil Science Research	SNRS	1
NCR-180	Site Specific Management	Agro/H SCREC	1
NCR-184	Management of Disease of Small Grains	Plant Path	1
NCR-189	Air Quality Issues Associated with Animal Facilities	BSE	4
NCR-192	North Central Regional Turfgrass	Agro/H	1
NCR-193	Maintaining Plant Health: Managing Insect Pests and Diseases of Landscape Plants	SNRS	1
NCR-194	Research on Cooperatives	Ag Econ	5
NCR-197	Agricultural Safety and Health Research	BSE	3
NCR-199	Implementation and Strategies for National Beef Cattle Evaluation	Biometry	1
NCR-200	Management Strategies to Control Major Soybean Virus Diseases in NCR	Plant Path	1
NCR-201	Integrated Pest Management	Agro/Hort Ent	1
NCR-202	Health and Survival of Honey Bee Colonies	Ent	1

No.	Title	Participating Unit *	Federal Goal
NCR-203	Impact of Human Capital Development on the Quality of Rural Community Life	AgLec	5
NCR-204	The Interface of Molecular and Quantitative Genetics in Plant and Animal Breeding	Agro/H	1
NCS-5	Water Quality Resource Strategy and Coordination	Agro/H Water Ctr	4
NCT-188	Diagnosis and Control of Mycobacterial Disease of Livestock and Wildlife	VBS	1
NCT-192	Metabolic Relationship in Supply of Nutrients for Lactating Cows	BSE	1
NCT-193	Watershed Nutrient Sources and Management as Related to Water Quality	BSE	4
NE-127	Biophysical Models for Poultry Production Systems	An Sci	1
NE-1010	Forage Crop Genetics and Breeding to Improve Yield and Quality	Agro/H	1
NRSP-1	Research Planning Using the Current Research Information System (CRIS)	ARD	NA
NRSP-3	The National Atmospheric Deposition Program (NADP) -	SNRS	4
NRSP-4	A National Agricultural Program to Clear Pest Control Agents for Minor Uses	Ent	1
NRSP-8	National Animal Genome Research Project	An Sci	1
S-295	Enhancing Food Safety Through Control of Food-Borne Disease Agents	FS&T	2
S-1002	New Technologies for Utilization of Textile Materials	TC&D	3
S-1005	Sources, Dispersal and Management of Stable Flies on Grazing Beef and Dairy Cattle	Ent WCREC	1
S-1007	Science and Engineering for a Biobased Industry and Economy	BSE	1

No.	Title	Participating Unit *	Federal Goal
S-1008	Genetic Selection and Crossbreeding to Enhance Reproduction and Survival of Dairy Cattle	An Sci	1
S-1010	Dynamic Soybean Pest Management for Evolving Agricultural Technologies and Cropping Systems	Ent	1
W-112	Reproductive Performance in Domestic Ruminants	An Sci	1
W-150	Genetic Improvement of Beans (Phaseolus vulgaris L.) for Yield, Disease Resistance and Food Value	Agro/H	1
W-173	Stress Factors of Farm Animals and Their Effects on Performance	Biometry	1
W-186	Genetic Variability in the Cyst and Root Knot Nematodes	Plant Path	1
W-190	Agricultural Water Management Technologies, Institutions and Policies Affecting Economic Viability and Environmental Quality	Ag Econ	4
W-1002	Nutrient Bioavailability -Phytonutrients and Beyond	NS&D	3
W-1177	Enhancing the Global Competitiveness of U S Red Meat	PREC An Sci	1
WCC-11	Turfgrass Research	Agro/H	1
WCC-55	Rangeland Resource Economics and Policy	Ag Econ	1
WCC-60	Science and Management of Pesticide Resistance	Ent	1
WCC-66	Integrated Management of Russian Wheat Aphid and Other Cereal Aphids	PREC Ent	1
WCC-72	Agribusiness Research Emphasizing Competitiveness	Ag Econ	5
WCC-77	Biology and Control of Winter Annual Grass Weeds in Winter Wheat	PREC Agro/H	1
WCC-92	Beef Cattle Energetics	An Sci	1
WCC–97	Research on Diseases of Cereals	Plant Path	
WCC-203	Animal Utilization of Products from Processing Agricultural Commodities	An Sci	1

* Unit Abbreviations

Ag Econ	Agricultural Economics
AgLEC	Agricultural Leadership, Education and Communication
Agro/H	Agronomy and Horticulture
An Sci	Animal Science
Biochem	Biochemistry
BSE	Biological Systems Engineering
Biometry	Biometry
CSD	Conservation and Survey Division
Ent	Entomology
FCS	Family and Consumer Science
FS&T	Food Science and Technology
IAPC	Industrial Ag Products Center
NS&D	Nutritional Science and Dietetics
Plant Path	Plant Pathology
SNRS	School of Natural Resource Sciences
TCD	Textiles, Clothing and Design
VBS	Veterinary and Biomedical Sciences
NEREC	Northeast Research and Extension Center
PREC	Panhandle Research and Extension Center
SCREC	South Central Research and Extension Center
WCREC	West Central Research and Extension Center