

2009 University of Nebraska Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

The Institute of Agriculture and Natural Resources (IANR) is part of a research one land grant university. The mission of our university is to meet the needs of its Nebraska citizens and provide internationally-recognized science and education. This mission is met by: advancing knowledge along the continuum from fundamental research to application; delivering education that addresses the current and emerging needs of the state; and by teaching tomorrow's professionals. The on-going cultivation of public-private partnerships helps make this mission achievable.

IANR works as an integrated teaching, research, and extension system. This integration of work is evident in the grant funds received, on educational curriculum delivered in both formal and non formal settings, and in the high placement of graduates in 21st century careers. To remain relevant, IANR adheres to a strategic plan that includes ongoing input from stakeholders. When the IANR Strategic Plan was rewritten in 2008, three themes were selected to guide the work:

- Sustainable and economically viable food and biomass systems
- Quality environment and effective natural resource management system
- Viable communities and appropriate quality of life for individuals and families

While these themes were consistent with those of the past strategic plans, the focus within these themes continues to be sharpened. Annually greater emphasis is placed on using the latest technological strategies for program delivery and research studies. Greater emphasis is put on integrated teams for scientific discovery.

In 2009, faculty of IANR were challenged to identify the strengths of teaching, research, and extension, with questions such as "for what are our programs best known?" and "how are our efforts impacting the outcomes for clientele?" At the same time Extension Board members across the state held one-on-one conversations with over 1700 individuals to identify programmatic outcomes that are most important to our Nebraska residents. These two information gathering efforts (faculty and stakeholders) when merged, produced key areas for emphasis within the theme areas:

Livestock systems (primarily beef)

Water, climate, environment

Crops of the future

Youth Development

Food, Nutrition, Health

Stakeholders did not identify economic development (KA806) as a primary focus for IANR programming in these discussions. Stakeholders saw other statewide entities better positioned for economic development related efforts. However stakeholders and faculty identified the importance of entrepreneurship. Entrepreneurship education now crosscuts most of the programmatic outcome areas. Four-H entrepreneurship curriculum developed to support 4-H age youth is being used in multiple states, and some Spanish speaking countries. Entrepreneurship is taught in other venues such as development of web based businesses, locally grown food businesses, and in the classroom. This emphasis on entrepreneurship was awarded a \$20,000,000 gift through the University of Nebraska Foundation fund drive to help propel forward this new programming thrust. The \$20,000,000 will be focused on helping young people prepare for careers as entrepreneurs who

contribute to the long term goal of Nebraska communities.

The Institute of Agriculture and Natural Resources will use the five societal challenges as the basis of our 2011 Plan of Work, follows the lead of NIFA. It is apparent though that the key emphasis areas of the 2008-2010 Plan of Work fit well within the five societal challenges. Examples of impact in these societal areas that are evidenced from our current work are:

Global Food Security and Hunger - Farmer Rancher/Cow Calf College held at U.S. Meat Animal Research Center (USMARC) reached over 80 cattle producers. Cattlemen indicated the estimated value of the information on global economy and production issues would help them at \$9.62/head over \$1.6 million.

Climate Change - 400 producers participated in the Nebraska Agricultural Water Management Demonstration Network (NAWMDN) saving an average of 2.6 inches of irrigation water/acre for corn and 2.1 inches of water/acre for soybeans resulting in \$2,814,000 and \$2,270,000 respectively in energy costs. The UNL Water webpage has over 200 ETgage sites registered from 37 counties.

Sustainable Energy - Over 100 land owners in 6 counties attended workshops on wind energy covering land rights, negotiations, liability, contracts, and payment methods. One wind association was formed and 63 landowners have signed contracts on 19,000 acres.

Childhood Obesity - 1,200 students learned the importance of MyPyramid. Teacher surveys found that 85% increased their knowledge of healthy diet and physical exercise and 90% could make healthier food choices after completing the programs.

Food Safety - 668 Omaha restaurant managers and culinary arts students participated in ServSafe and hand washing to reduce the risk of H1N1. The Health Department has noted an increase in sanitation scores.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	212.0	0.0	136.0	0.0
Actual	186.0	0.0	183.0	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

- Internal University Panel
- External Non-University Panel
- Combined External and Internal University Panel
- Combined External and Internal University External Non-University Panel

2. Brief Explanation

The extension teams and work groups within each action plan updates their plans annually using stakeholder input and evaluation results from delivered programs. Every faculty member with a research appointment in the Agricultural Research Division (ARD) has a current approved peer-reviewed project that defines his or her area of research investigation. The peer review process includes the Unit/Research and Extension head, one member of the faculty with relevant expertise, and an Associate Dean of ARD. Following review and acceptable revision, if necessary, the project outline is forwarded to USDA-CSREES for inclusion in the CRIS database.

Another review process, which combines merit and peer review, is the annual review by state commodity check-off boards of more than 100 proposals from extension and ARD faculty. Proposals selected for funding address the most significant problems currently facing the producer members of these boards and clearly communicate the research/extension relevance to user needs. This is another review process that provides valuable input to the extension and ARD planning efforts.

Academic units (subject matter departments and Research & Center Centers) complete a comprehensive five-year review to ensure program quality and relevance. Teams comprised of three to six external panel members, and two or three faculty panel members from other academic units, conduct these reviews. The review team completes its assessment by the development of a report that helps the academic unit focus its work for the next five years. It is the responsibility of the IANR Deans to work with the academic unit's administrator and faculty to accomplish the goals identified by the unit, and approved by the review team. Recommendations of the unit review are incorporated into the unit's annual goal statement for the five years till the next review.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder individuals
- Survey of the general public

Brief explanation.

The University of Nebraska-Lincoln (UNL) Extension and Agricultural Research Division collaborate to plan and develop programs. These divisions of the Institute of Agriculture and Natural Resources (IANR) have worked together to develop an IANR integrated strategic plan for more than 10 years. Listening sessions across the state provide significant input to the strategic planning process. Some of the listening sessions target specific (traditional and non-traditional stakeholder) groups while others are open to general stakeholder input. The listening sessions are always conducted in a way to foster input from all participants.

Extension action teams are asked to seek program input from a minimum of five key stakeholders annually (determined to represent a significant population or organization or to be a key leader). This input has been invited by some teams in a formal manner with invitations to specific individuals while other teams use surveys of program participants. In each case the participants are encouraged to provide input for program planning and evaluation.

Most of the UNL academic departments and research and extension centers have advisory committees that represent stakeholder groups. These advisory groups are encouraged to provide input to both extension and research programs. The committees are selected to be representative of the stakeholders served by the unit.

Stakeholder input is important to IANR. Last year over 1700 individuals gave input to the identification of program priorities. Led by Extension Board members, individual contacts were made to identify priority issues. Reported in the overview statement, the Extension Board members interacted with some individuals familiar with the mission of IANR, as well as those not familiar. It was a statewide effort carried out in seventy-five percent of the state's counties.

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use External Focus Groups

Brief explanation.

IANR uses several methods to identify individuals and groups to provide input to our research and extension programs.

Extension action teams are responsible for identifying stakeholders familiar with the subject matter and related issues impacting state residents. Stakeholders include commodity groups, state agencies, private entities, school systems, county officials, etc.

Unit advisory group participants are identified by administrators and faculty to represent the stakeholders with an interest in the specific unit's research and extension program. The participants typically represent commodity groups, the green industry, related industrial entities, and advisory groups for IANR such as Ag Builders of Nebraska and Community, Youth & Family Partners.

For IANR listening sessions, extension educators housed at the geographic site are asked to identify key community stakeholders. In addition, for some sessions general invitations to the public are made to achieve a broader range of input. Some listening sessions target leaders of specific groups to suggest participants. For example, listening sessions in Omaha and Lincoln target individuals who are cognizant of the needs of constituents.

The 4-H program uses a stratified group process technique to include input of specific groups. In addition, 4-H uses youth curriculum committee members to help identify critical curricula topics.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public

Brief explanation.

The IANR listening sessions are face-to-face meetings with traditional and non-traditional stakeholder individuals. Both Extension and the Agricultural Research Division often have representatives present at the sessions to help receive input from the stakeholders. IANR is fortunate that faculty (specialists, educators and researchers) engage in one-on-one relationships with many of the federal, state and local agencies in the state, commodity organizations, related industries, educational organizations, and a variety of non-profit organizations. This engagement provides significant stakeholder feedback. Extension action teams use a variety of methods to obtain input including face-to-face meetings, web-based surveys, and surveys of program participants during specific program activities. The Extension action teams seek to answer the following questions: Are the action plan's educational goals the highest priorities? Does the action plan represent work that is complementary, but not duplicate, work of other organizations? Are there potential collaborators for these action plans? Are you, as a stakeholder, aware of potential grant/contract funding sources? Are there educational goals of the action plan that should be eliminated or handed off to other entities? Meetings with leaders within minority population audiences are held to help identify needs and programs to serve audiences such as Latino and Native American populations. The Extension Board members held over 1,700 one-on-one interviews. Questions asked by Extension Board members are: When you think about UNL Extension what are some of the things you value most? When you think of the benefits that UNL Extension brings to the community what comes to mind? What are key programs that we deliver better than anyone else? What are current and/or emerging needs that UNL Extension can address? What new audiences should we be considering? The Nebraska Rural Poll is sent to approximately 7,000 rural Nebraska residents with between 2,500 and 3,000 responses each year over the last 12 years. The poll asks for responses to a variety of rural issues. UNL requires that each administrative unit conduct a program review every five years. In most cases the units conduct some type of stakeholder input process such as surveys, one-on-one interviews, and focus group sessions to gather input for planning future research and education programs. Input from stakeholders for development of the 4-H strategic plan is obtained annually via an interactive web site.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

Brief explanation.

UNL Extension and Agricultural Research Division believe that stakeholder input is essential to developing and delivering on target research and educational programs.

The IANR listening sessions continue to help identify priority issues for consideration as we consider research and education programs. The listening session engagement provides access to information about trends and issues that impact Nebraskans. The listening session feedback is provided to departments and extension actions teams.

The County Conversation summaries have been shared with all extension faculty and academic department administrators. Extension action teams use this information as they develop program plans.

The engagement with minority audience stakeholders is used to help plan and deliver programs that promotes cross cultural understanding and used to involve teens in local decision making. Hispanic and Native American coalitions in one community joined together to help at risk youth learn how to give back to their communities through service projects.

Input from the Nebraska 4-H information gathering process is continually used to refine a Nebraska 4-H strategic plan. Stakeholders identified four target areas for youth development which were used as the basis for the plan. The strategic plan focus is now Science, Engineering and Technology; Life Skills; Healthy Lifestyles; and Career Education.

Through stakeholder involvement, Research results are made available to a broader range of stakeholders, Extension education programs are better marketed across the state, collaborating entities become program sponsors and provide matching funds.

Program priorities are a decision factor in the role of new faculty. As Extension repositioned its action teams the roles of Extension Educators working within content areas were also reassessed. The most evident change in 2009 was Extension Educators who now focus their work in entrepreneurship. Input helps identify research priorities that are used to develop research projects.

Brief Explanation of what you learned from your Stakeholders

Stakeholders will be advocates for your research and extension programs if they believe in the priorities selected for emphasis, if they are involved in the program selection process, and if the outcomes/accomplishments of your research and extension programs make a difference for the state's residents.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
4764447	0	3697802	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	4620007	0	3257535	0
Actual Matching	4459697	0	3559715	0
Actual All Other	44152684	0	85905256	0
Total Actual Expended	53232388	0	92722506	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from				
Carryover	778831	0	485715	0

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Sustainable and Economically Viable Food and Biomass Systems
2	A quality Environment and Effective Natural Resource Management
3	Viable Communities and Appropriate Quality of Life for Individuals and Families

V(A). Planned Program (Summary)**Program # 1****1. Name of the Planned Program**

Sustainable and Economically Viable Food and Biomass Systems

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	4%		9%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	4%		8%	
205	Plant Management Systems	11%		8%	
206	Basic Plant Biology	6%		8%	
211	Insects, Mites, and Other Arthropods Affecting Plants	3%		10%	
212	Pathogens and Nematodes Affecting Plants	3%		7%	
213	Weeds Affecting Plants	3%		4%	
215	Biological Control of Pests Affecting Plants	2%		2%	
216	Integrated Pest Management Systems	9%		4%	
301	Reproductive Performance of Animals	8%		5%	
302	Nutrient Utilization in Animals	5%		8%	
305	Animal Physiological Processes	2%		4%	
307	Animal Management Systems	8%		4%	
315	Animal Welfare/Well-Being and Protection	7%		2%	
402	Engineering Systems and Equipment	6%		4%	
501	New and Improved Food Processing Technologies	5%		5%	
511	New and Improved Non-Food Products and Processes	3%		5%	
601	Economics of Agricultural Production and Farm Management	8%		2%	
606	International Trade and Development	2%		1%	
901	Program and Project Design, and Statistics	1%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)**1. Actual amount of professional FTE/SYs expended this Program**

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	78.0	0.0	86.0	0.0
Actual	73.0	0.0	124.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c 1918273	1890 Extension 0	Hatch 2225538	Evans-Allen 0
1862 Matching 1934820	1890 Matching 0	1862 Matching 2415954	1890 Matching 0
1862 All Other 18736778	1890 All Other 0	1862 All Other 58488182	1890 All Other 0

V(D). Planned Program (Activity)**1. Brief description of the Activity**

Conduct research and extension programs to develop/deliver new and improved crop and livestock integrated management programs. Conduct research and extension programs to develop/deliver new and improved information to help producers create sustainable crop and livestock production programs. Conduct research and extension programs to develop/deliver new and improved information to identify new and emerging markets and marketing strategies for agricultural products and agribusiness. Conduct research and extension programs to develop/deliver information on new or improved food products and technologies and emerging efficiencies of production to Nebraska's ag-based industries.

2. Brief description of the target audience

Targeted audiences will include a broad range of small and large agricultural producers and processors. Nebraska-based processors, especially start-up companies, will receive high priority. Specific groups that will use the research and education programs include:

Crop and livestock producers State agribusiness Food processing facilities Natural Resource Districts Research and extension specialists Extension educators Commodity groups Nebraska independent crop consultants Seed fertilizer and pesticide suppliers Commercial pesticide applicators Certified crop advisors Neighboring state institutions Scientists and engineers developing new knowledge

V(E). Planned Program (Outputs)**1. Standard output measures**

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	37100	300000	750	2000
Actual	20400	355000	82812	0

2. Number of Patent Applications Submitted (Standard Research Output)**Patent Applications Submitted**

Year: 2009
Plan: 2
Actual: 3

Patents listed

PP20,013, PP19,893, 5,789,001

3. Publications (Standard General Output Measure)**Number of Peer Reviewed Publications**

2009	Extension	Research	Total
Plan	45	175	
Actual	45	313	358

V(F). State Defined Outputs**Output Target****Output #1****Output Measure**

- Number of scholarly publications and outputs related to economically viable and sustainable food and biomass systems.

Year	Target	Actual
2009	220	313

Output #2**Output Measure**

- Number of workshops, continuing education programs, web-based curricula and field days/tours related to economically viable and sustainable food and biomass systems.

Year	Target	Actual
2009	445	430

Output #3**Output Measure**

- Number of Agricultural Research Division projects related to economically viable and sustainable food and biomass systems.

Year	Target	Actual
2009	190	96

Output #4**Output Measure**

- Number of new extension publications and other education resources related to economically viable and sustainable food and biomass systems.

Year	Target	Actual
2009	35	51

Output #5**Output Measure**

- Number of new or improved plant and animal genetic materials or resources related to economically viable and sustainable food and biomass systems.

Year	Target	Actual

2009

25

5

Output #6

Output Measure

- Number of new products and decision tools developed and made available to clientele related to economically viable and sustainable food and biomass systems.

Year

Target

Actual

2009

10

4

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Nebraska farmers will increase profitability through adoption of research and extension information provided by IANR programs (measured by value placed on the information by clientele).
2	Nebraska ranchers and feeders will increase profitability through adoption of research and extension information provided by IANR programs (measured by value placed on the information by clientele).
3	Nebraska farmers and ranchers will have sustainable food and biomass systems through adoption of best management practices (measured by percent of clientele adopting best management practices).
4	Nebraska will have access to a highly trained and educated workforce for economically viable and sustainable food and biomass systems (indirectly measured by number of undergraduate and graduate students receiving degrees).
5	Nebraska farmers and ranchers will rely on IANR research and extension programs to assure an economically viable and sustainable food and biomass system (measured by percent of state acreage and livestock represented at education programs).

Outcome #1**1. Outcome Measures**

Nebraska farmers will increase profitability through adoption of research and extension information provided by IANR programs (measured by value placed on the information by clientele).

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	133400000	275000000

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

To remain economically viable and environmentally sustainable in a rapidly changing world, Nebraska farmers and related agribusiness representatives must obtain and incorporate new research-based knowledge as quickly as possible in order to gain efficiencies, be better stewards of our natural resources, and take advantage of new opportunities.

What has been done

In 2009, IANR program impact reports indicated participation by about 15,700 farmers, agricultural consultants, and other agri-business professionals, representing over 12 million acres directly managed by crop producer and 47 million acres influenced by consultants or agribusiness representatives. Specific to this priority, UNL Extension hosted 520 workshops, field days, professional development sessions, and web-delivered seminars to share new research based information and recommendations. In addition, many additional individuals were contacted through our statewide CropWatch web site (<http://extension.unl.edu/cropwatch>), a significant Crops of the Future university display at Husker Harvest Days, and other awareness building initiatives.

Results

Clientele attending IANR sponsored events self-assessed the value of the information in potential increased profits or loss mitigation at a conservatively estimated value of \$275 million for their cropping systems. Extension sponsors a wide diversity in educational programs including the following examples. The Rural Advantage conference, targeting diversified and sustainable agricultural practices, participants identified the most common changes in practice (6 months after conference) resulting from the educational experience included improved stewardship of natural resources, adaptation of holistic management principles, and improved production practices. A Profitability of Fertilizer and Manure Use program reached 166 producers and 55 advisors representing 2,750,000 acres with a participant estimated value of \$6.8 million. A Greater Quad County On-farm Research program impacted 1,000 producers directly or through follow-up education representing 1 million acres and \$5.6 million in participant estimated value.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms

203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management
606	International Trade and Development
901	Program and Project Design, and Statistics

Outcome #2

1. Outcome Measures

Nebraska ranchers and feeders will increase profitability through adoption of research and extension information provided by IANR programs (measured by value placed on the information by clientele).

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	81262000	32800000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

To remain economically viable and environmentally compatible in a rapidly changing world, Nebraska ranchers and feeders and related agribusiness representatives must obtain and incorporate new research based knowledge as quickly as possible in order to gain efficiencies, be better stewards of our natural resources, and take advantage of new opportunities. One of UNL Extensions five spires of excellence targets beef cattle systems.

What has been done

In 2009, IANR program impact over 4,700 ranchers, feeders, and related agri business professionals, representing about 4.7 million head of cattle participated in 115 educational programs. UNL Extension faculty host the #1 web site on beef from a search engine perspective and also lead the national eXtension beef web initiative. Issues targeted in 2009 include ethanol co-product utilization by cow-calf producers, genetic selection tools including DNA markers, forage quality, niche pork production, and dairy profitability. For example, Nebraska hosted an in-depth professional development session for 100 educators from 10 states on ethanol co-product utilization in small cattle operations. Those educators in turn taught 4,200 producers over the next 8 months.

Results

Clientele surveys estimated an average value of \$7.75 per head in 2009 representing a value of approximately \$33 million. Co-product utilization targeting small cattle producers was the focus of many recent extension programs. A central Nebraska workshop series on this topic was attended by 450 producers and advisors representing 60,000 head of cattle and 400,000 acres of range. DNA marker technology was the focus of a south-central Nebraska effort attended by 120 participants representing 101,000 head. The Beef Feedlot Roundtable targeting cattle finishers reached 300 producers and advisors representing 2.5 million cattle with information valued by the participants at over \$3 per head. A Partners in Progress Beef Cow/Calf seminar was jointly hosted by UNL Extension and USDA ARS and estimated by participants to have an average value of \$9.60 per head and \$1.6 million overall.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection
402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management
606	International Trade and Development
901	Program and Project Design, and Statistics

Outcome #3

1. Outcome Measures

Nebraska farmers and ranchers will have sustainable food and biomass systems through adoption of best management practices (measured by percent of clientele adopting best management practices).

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	70	76

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

To remain economically viable and environmentally compatible in a rapidly changing world, Nebraska farmers, ranchers, and related agribusiness representatives must obtain and incorporate new research based knowledge as quickly as possible. Clientele expressed intent to implement changes based on the new information presented at UNL sponsored events is a strong indication that the information presented was timely and of value to the agricultural industry.

What has been done

Participant surveys from workshops, field days, tours, clinics, on-farm research and electronically delivered offerings included a variety of quantitative economic and behavioral change questions. Extension faculty delivered approximately 15,500 learner hours of education to over 4,700 livestock managers and advisors through more than 110 unique workshops. In addition, Extension faculty delivered approximately 49,200 learner hours of education to almost 15,700 crop managers and advisors through more than 310 unique workshops. In addition, the web has become a significant investment with UNL Extension releasing a new CropWatch (cropwatch.unl.edu) web resource in 2009 combining the resources of multiple disciplines for multiple crops at a single web site. In addition, Extension's Beef web site (beef.unl.edu) continues as the number 1 web site for Google search on beef related topics.

Results

The surveys indicated that over 76% of clientele participating in University of Nebraska sponsored workshops, field days, tours and electronically delivered events definitely would or probably would make changes as a result of the new research based information presented. The crop producers attending the events directly manage 12,000,000 crop acres (NE has 21.5 million crop acres) while advisors impact the decisions of an additional 47 million crop acres both inside and outside NE. Livestock producers attending these events directly manage 4.2 million head (NE has 9.4 million head of livestock). No estimate could be made of livestock influenced by the approximately 500 livestock advisors who attended extension educational events. More than 50 impact reports would suggest that Extension Educational products provide economic value to the producers in the state, with an average of 76% of participants using the information to make or plan changes in their operations. Individuals attending more than one education activity during 2009 produces some double counting in above numbers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection
402	Engineering Systems and Equipment
501	New and Improved Food Processing Technologies
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management
606	International Trade and Development
901	Program and Project Design, and Statistics

Outcome #4**1. Outcome Measures**

Nebraska will have access to a highly trained and educated workforce for economically viable and sustainable food and biomass systems (indirectly measured by number of undergraduate and graduate students receiving degrees).

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	100	0

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

To remain economically viable and environmentally compatible in a rapidly changing world, Nebraska farmers and related agribusiness representatives must have access to a highly educated and trained work force in order to take advantage of new information, incorporate new technologies, and adjust to changing economic, social, and environmental conditions.

What has been done

The University of Nebraska offers 27 undergraduate programs of study and two pre-professional programs in agriculture and natural resources, and 15 Master of Science and 12 Ph.D. programs. Our programs include agribusiness, animal science, agronomy, biochemistry, biological systems engineering, fisheries and wildlife, food science and technology, pre-veterinary medicine, professional golf management, etc.

Results

In 2009, there were 325 Baccalaureate and 156 Masters/Doctoral degrees conferred at the University of Nebraska in agricultural and natural resources related areas. Over 85% of our Baccalaureate degree students find jobs in their fields or continue with their professional education; approximately 70% take their first job in Nebraska.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants

216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection
402	Engineering Systems and Equipment
501	New and Improved Food Processing Technologies
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management
606	International Trade and Development
901	Program and Project Design, and Statistics

Outcome #5

1. Outcome Measures

Nebraska farmers and ranchers will rely on IANR research and extension programs to assure an economically viable and sustainable food and biomass system (measured by percent of state acreage and livestock represented at education programs).

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	64	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

To remain economically viable and environmentally compatible in a rapidly changing world, Nebraska farmers and related agribusiness representatives must have access to a highly educated and trained work force in order to take advantage of new information, incorporate new technologies, and adjust to changing economic, social, and environmental conditions. In 2009, our Extension Action Teams identified our "Signature Programs" that will involve a targeted, statewide-delivered, educational programs engaging teams of specialists and educators. The behavioral and conditional outcomes from these programs will address Beef Systems Profitability, Enhancing Beef Cattle Health/Well Being and Economic Risk Management in Cropping Systems for the next several years.

What has been done

Participant surveys from workshops, field days, tours, clinics, and electronically delivered offerings included a variety of quantitative economic and behavioral change questions. Approximately 20,400 farmers, ranchers, feedlot, and related agribusiness professionals participated in the over 400 workshops and educational offerings. These individuals reported directly managing 12 million crop acres (56% of NE cropland), influencing decisions on 47 million crop acres (219% of Nebraska's cropland), and directly managing 4.2 million head of livestock (45% of

all Nebraska's livestock). Livestock advisors influence decisions on a significant additional number of livestock head but that value could not be estimated accurately. Crops advisors influencing 219% of Nebraska crop acres is explained in part by Nebraska renown Crop Diagnostic Clinics attracting many out-of-state advisors and some individuals attending more than one educational event.

Results

Example programs include the Soybean Management Field Days held in 4 locations which attracted 376 participants representing 316,000 acres; Quad County on-Farm Research events attracted 1,000 producers representing 1 million acres to learn the results of on-farm research trials; 2009 Rural Advantage/Healthy Farms Conference attracting 150 organic and diversified farmers with approximately half valuing the program a greater than \$2000; Profitability of Fertilizer and Manure programs attracted 225 participants representing 2.75 million acres; and Crop Production Clinics which attracted 1,169 individuals including 690 commercial pesticide applicators which influenced decisions on more than all of the crop acres in Nebraska. UNL Extension also hosts in-depth educational experiences such as the Nebraska Ranch Practicum which brought 33 participants (9,500 cows and 119,000 acres of range) together multiple times over a full year to address systems based sustainability and profitability issues.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities

Brief Explanation

Natural disasters: Drought conditions continue to diminish in 2009. Only limited areas in southeastern Nebraska were abnormally dry during most of the 2009 growing season or in moderate drought during part of the growing season. National Weather Service prediction is for drought conditions to be unlikely through June 2010.

Economy: 2009 was a year of moderating crop costs and prices for crops and generally positive economic conditions for crop producers. The recession and trade protection policies of many key trading partners have severely dampened demand for meat products causing significant losses within all animal

production sectors. Some signs of easing trade restrictions, improving economy and reduced animal product supplies is creating the first signs of optimism in the animal industry.

The continued strength of the corn-based ethanol industry has brought significant economic development and income potential to many rural areas. A temporary correction in the feasibility of corn ethanol fuels slowed ethanol production in 2008 but the industry has regained strength in 2009. The one concern that may limit this potential is west coast state's public policy and controversial accounting procedures of carbon footprint of corn-based ethanol. California is the number one importer of Nebraska ethanol, a market that could end in 2010. Nebraska ethanol plants consume 600 million bushels of grain, produce 1.8 billion gallons of ethanol, and have represent a \$1.4 billion capital investment in Nebraska.

Public policy and Government Regulations: Public pressure by the Human Society of the US is causing significant concerns among all agricultural organizations. Policy implementation in California and other states sponsored by HSUS is seen as promoting economically unsustainable animal agricultural practices in the US by agricultural organizations.

Appropriation Changes: Reduced state tax collection has led to university budget reductions over the past year with greater reductions in 2011 when stimulus funds are no longer available to balance state budgets. Additional elimination of some research and extension program areas is anticipated.

Competing public priorities: A customer base that has little connection and no understanding of modern agricultural production systems and values of the farming community and a desire to use public policy to design agricultural systems is very frustrating to the agricultural community. Some aspects of this public oversight of food production is seen as beneficial such as local foods production and organic systems because of potential for premium prices. However, the lack of acceptance by some groups of many production technologies for reducing inputs (e.g. pesticide inputs with use of genetically modified seeds) or increasing production efficiencies and yields (e.g. use of antibiotics and growth promotants in animal production) comes at the same time that society is asking for greater production to meet a growing food and energy feedstock need. These competing public priorities are leaving farmers frustrated with the meddling by customers and policy makers that the agricultural community believes to be poorly informed.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Before-After (before and after program)
- During (during program)

Evaluation Results

UNL Extension has divided into five spires of excellence with two specifically targeting agriculture and natural resource issues: 1) Beef Systems, 2) Crops of the Future. The Action Team supporting each spire has identified one or more "Signature Programs" that first became active at the start of 2010. The "Signature Programs" will be delivered statewide and establish methodologies for measuring statewide impact. The faculty team supporting each spire is in the process of developing or adapting statewide evaluation tools targeting clientele outcomes identified in the statewide action plans. These tools will target educational program evaluation and provide a means of estimating knowledge gain, intended practice change, and likely conditional changes. These tools supporting these "Signature Programs" should be in place by July 1, 2010, begin collecting data for the second half of 2010, and serve as the foundation of our Extension systems measurement of impact for the next several years.

Key Items of Evaluation

Impact indicators and supporting statewide survey are being completed for one to three Signature Programs (initiated for 2010) associated with each Action Team. The preliminary statewide measures of impact that will be utilized for the next several years are as follows:

Beef Systems (Cow-Calf) Profitability:

Changes in production practices
Changes in business skills
Savings per animal

Beef Systems (Feedlot) Profitability:

Changes in production practices
Reduced environmental challenges
Savings per animal

Enhancing Beef Cattle Health, Quality, and Wholesomeness

1. Reduced cattle disease incidence and improved cattle performance
2. Greater use of health records
3. Increased adoption of pre-harvest methods for beef quality and safety

Integrated Pest Management

1. Farmers etc. learn principles of IPM
2. IPM tool and resources are readily available to clientele
3. IPM is implemented
4. Consultants, other Ag Professionals and Ag service providers use science based

IPM management recommendations

Economic Risk Management

1. Federal, state, and local food policy
2. Land, machinery, other ag assets, and input and production costs
3. Crop insurance products, crop marketing, and exposure to emerging markets
4. Enterprise and whole farm financial analysis
5. Transition planning and employee / business management

V(A). Planned Program (Summary)**Program # 2****1. Name of the Planned Program**

A quality Environment and Effective Natural Resource Management

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	2%		5%	
102	Soil, Plant, Water, Nutrient Relationships	17%		16%	
111	Conservation and Efficient Use of Water	17%		25%	
112	Watershed Protection and Management	12%		8%	
121	Management of Range Resources	10%		4%	
122	Management and Control of Forest and Range Fires	1%		0%	
123	Management and Sustainability of Forest Resources	1%		2%	
124	Urban Forestry	1%		0%	
125	Agroforestry	1%		0%	
131	Alternative Uses of Land	1%		1%	
132	Weather and Climate	9%		7%	
133	Pollution Prevention and Mitigation	12%		12%	
135	Aquatic and Terrestrial Wildlife	7%		9%	
141	Air Resource Protection and Management	1%		0%	
403	Waste Disposal, Recycling, and Reuse	3%		2%	
404	Instrumentation and Control Systems	1%		6%	
405	Drainage and Irrigation Systems and Facilities	2%		1%	
605	Natural Resource and Environmental Economics	2%		2%	
	Total	100%		100%	

V(C). Planned Program (Inputs)**1. Actual amount of professional FTE/SYs expended this Program**

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	44.0	0.0	35.0	0.0
Actual	38.0	0.0	43.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c 721813	1890 Extension 0	Hatch 726526	Evans-Allen 0
1862 Matching 604984	1890 Matching 0	1862 Matching 857379	1890 Matching 0
1862 All Other 6451934	1890 All Other 0	1862 All Other 19959040	1890 All Other 0

V(D). Planned Program (Activity)

1. Brief description of the Activity

IANR will conduct research and deliver extension education programs that will enable Nebraska agricultural water users to use water in ways that maximize efficiency and profitability, protect water quality and meet regulatory requirements. Key elements of this effort include:

Development of an improved understanding of basic plant, water, soil and climate relationships.

Evaluation of alternative water delivery systems including sprinkler irrigation technologies and sub-surface drip irrigation systems.

Evaluation of alternative irrigation water management strategies for all irrigation system types and particularly for situations where deficit irrigation is necessary.

Development of adapted crop varieties, using either conventional breeding programs or genetic modification, that are more drought tolerant, perform well in deficit irrigation situations or require less evapotranspiration for profitable production. Evaluate alternative crops that require less applied irrigation water or are adapted to non-irrigated production, that will fit into Nebraska cropping systems and for which a market exists.

Evaluate opportunities for shifting from irrigated to non-irrigated production or other enterprises that will maintain producer and community economic viability and sustainability.

Develop decision-making support systems that enable producers, policy makers, financial institutions and others to make critical decisions regarding crop production and water resources use.

Enhance research and extension education programs that will increase the scientific knowledge base and public understanding of the occurrence, movement and quality of ground water; factors that impact the quantity and quality of surface water; the interrelationships between ground water and surface water; and the ecology of Nebraska's ground water and surface water systems.

Develop research and extension education programs that analyze the water resource and economic impacts of existing or proposed public policies.

Enhance research and extension education programs that enable Nebraskans to protect ground water and surface water quality and respond to regulatory requirements.

Enhance research and extension education programs that will enable communities and individuals to better understand and use appropriate technologies to protect the quality of drinking water supplies and to remove contaminants when drinking water standards are exceeded.

Research-based information will be provided for individuals, groups and decision makers that will enable informed decisions relative to use of limited water supplies and protection of water quality.

2. Brief description of the target audience

Nebraska farmers and ranchers, along with landowners, are the primary target audience for this work. In addition, target audiences will include land managers, bankers, agricultural consultants and agribusiness professionals who provide products and services to farmers and ranchers. The program's research and education efforts will provide valuable information for state and local policy makers (especially Natural Resource District Boards of Directors) as they make decisions regarding natural resources issues. The program will provide agency staff with the knowledge they need to carry out the agency responsibilities and mandates.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	10000	20000	8000	20000
Actual	35800	20300	41100	82200

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2009

Plan: 1

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	15	35	
Actual	31	121	152

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Scholarly publications and outputs related to water management and water quality.

Year	Target	Actual
2009	50	61

Output #2

Output Measure

- Number of water management and water quality education workshops/presentations, continuing education programs, web-based curricula and field days/tours.

Year	Target	Actual
2009	150	88

Output #3

Output Measure

- Number of Agricultural Research Division projects that include water management and water quality as a key component.

Year	Target	Actual
2009	50	30

Output #4

Output Measure

- Number of new extension publications and other education resources developed.

Year	Target	Actual
2009	20	31

Output #5

Output Measure

- Number of scholarly publications and outputs addressing environmental and natural resources issues other than water management and water quality.

Year	Target	Actual
2009	30	60

Output #6

Output Measure

- Number of Agricultural Research Division projects that address environment and natural resource issues other than water management and quality.

Year	Target	Actual
2009	30	48

Output #7

Output Measure

- Number of education workshops/presentations, continuing education programs, web-based curricula and field days/tours that address environment and natural resource issues other than water management and quality.

Year	Target	Actual
2009	40	151

V(G). State Defined Outcomes**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Irrigators will gain new knowledge and awareness of water conservation practices, crop water use rates, limited irrigation, irrigation scheduling and new irrigation technologies.
2	Nebraska farmers, ranchers, businesses and home owners will adopt new practices that will improve water management and protect water quality. This will be measured as the percentage of education program participants who indicate that they have adopted or plan to adopt new practices.
3	Livestock producers will continue to gain knowledge and awareness of appropriate practices to manage livestock manure.
4	Livestock producers will develop comprehensive nutrient management plans (CNMPs) and use best management practices for livestock manure handling and storage.
5	Nebraska farmers will increase their knowledge and awareness of how integrated pest management and pesticide best management practices can help protect water quality.
6	Nebraskans will gain increased awareness and knowledge of natural resources including wildlife, forest resources and rangeland and the relationship between natural resources stewardship, sustainability, economic viability and the environment.
7	Consumptive water use by irrigated crops will be reduced. The outcome measure will be the percent reduction of estimated consumptive water use when the current year is compared to the estimated consumptive water use in calendar year 2006. The consumptive water use will be estimated using the irrigation water pumped in Natural Resources Districts that require the use of water measurement devices.
8	Nebraska will not exceed its allocation of water in the Republican River as allowed by the interstate compact with Kansas and Colorado. Nebraska's allocation is 49% of the average annual water supply. The output measure will be the percent of the Republican River average annual water supply used by Nebraska.

Outcome #1**1. Outcome Measures**

Irrigators will gain new knowledge and awareness of water conservation practices, crop water use rates, limited irrigation, irrigation scheduling and new irrigation technologies.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	2000	1600

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

According to the USDA 2007 Farm and Ranch Irrigation Survey, Nebraska irrigates approximately 8.45 million acres with more than 6.70 million acre-feet of water annually. This represents a 11% increase in acres irrigated with 21% less water. This change is likely a result of both difference in rainfall patterns and concerted efforts promoting efficient irrigation water use. In 2004, state policy established a process for defining watersheds as a fully or over-appropriated. Part or all of eleven Natural Resource Districts are currently defined as fully or over-appropriated. Over-appropriated basins are required to reduce water use to 1997 levels. Discussion continues on defining additional areas of Nebraska as over or fully appropriated. State public policy continues to emerge and change annually on a variety of topics related to water use by irrigation.

What has been done

2009 irrigation water use extension programs were attended by 1,600 learners resulted in more than 4,800 learner hours of education delivered through approximately 90 workshops. UNL Extension initiatives include educational conferences (e.g. Irrigation and Energy Conservation Workshops) and field days (e.g. 9 on-farm demonstrations and 10 field days in the Republican River watershed) and on-farm research (e.g. Nebraska Agricultural Water Management Demonstration Network-NAWMDN). NAWMDN continues to grow into a robust on-farm extension initiative demonstrating irrigation water savings through in-field ET and soil moisture monitoring. A growing number of Natural Resource Districts support this extension led initiative by cost-sharing on instrumentation followed by Extension training farmers on its application.

Results

Currently proven technologies and management practices continue to demonstrate the potential to reduce statewide irrigation water pumped by 2 inches (or 460 billion gallons per year) or more and energy use by 42 million gallons of diesel fuel equivalent per year or more. In addition, for every acre-inch of water not pumped, we benefit from 55 pounds of reduced CO₂ emissions creating a current potential for a 490,000 tons of reduction in CO₂ emissions. The USDA 2007 Farm and Ranch Irrigation Survey shows a reduction in water use between 2003 and 2007 of 21% despite a 11% increase in total irrigated acres. The survey further suggests that the number of farms using water conserving technologies promoted by extension is growing. For example, soil moisture sensing application has grown from 8.4 to 14% and daily ET reports from 19 to 30% between 2003 and 2007. Separate data collected from 6 NRDs on 2.2 million irrigated acres suggests that water use has dropped by more than 25% in five years. These reductions are a result of extension education, public policy pressure, and changes in rainfall patterns.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
405	Drainage and Irrigation Systems and Facilities

Outcome #2

1. Outcome Measures

Nebraska farmers, ranchers, businesses and home owners will adopt new practices that will improve water management and protect water quality. This will be measured as the percentage of education program participants who indicate that they have adopted or plan to adopt new practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	70	80

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Agriculture impacts water quality. A 2009 Nebraska groundwater quality report from the Department of Environmental Quality suggests a nitrate trend showed increasing slope about 1.25 ppm per decade from 1973 to 1993 while the trend from 1994 to 2008 is flat. A 2009 USGS analysis showed that all of the pesticides assessed (including common corn pesticides such as atrazine, metolachlor, alachlor, cyanazine) on 32 Corn Belt rivers including 3 in Nebraska, were dominated by varying degrees of concentration downtrends. Only one pesticide -- simazine, which is used for both agricultural and urban weed control -- increased from 1996 to 2006.

What has been done

In 2009, 3500 adults participated in 109 workshops targeting water quality related topics (excluding pesticide related topics -reported in Outcome #5) representing 10,500 learner-hours. An additional 3,600 youth participated in 44 workshops representing about 7200 learner-hours. Extension hosts educational experiences targeting issues related to water quality impairment from nitrogen, erosion, and herbicides and encouraging and best practices for reducing contamination associated with tillage, irrigation, fertilization, chemigation, on-site waste water, and municipal storm water. Examples include (1) Shell Creek Water Quality program to address watershed specific water issues; (2) continued implementation of a UNL wide water web site; (3) workshop series and publications targeting stormwater management issues for Phase II Nebraska cities (10,00 to 50,000 people) and community compliance with Clean Water Act permitting requirements.; (4) 36 formal and non-formal educators attending a Extension Healthy Water Healthy People (HWHP) workshop were engaged in extensive curriculum and hands-on activities targeting water quality and quantify principles.

Results

Sample outcomes or impacts include: (1) Shell Creek project impacts include 48 producers implementing no-till planting on nearly 6,600 acres of cropland resulting in an estimated soil erosion reduction of over 65,000 tons annually and conservation buffer practices were installed on a total of 215 acres of cropland reducing soil erosion on the order of 3,200 tons per year and provide excellent wildlife habitat; (2) UNL Water Web site has been accessed by 39,500 visitors viewing 128,028 web site pages representing a diverse selection of water-related information with highest frequency addressing agriculture irrigation and water quality protection associated with manure management; (3) sustainably managed lawns and landscapes will be put to use by 84% of green industry professionals attending the UNL Extension-led Lawn and Landscape Update on storm water management; (4) two to three years after attending a HWHP workshop, educators responding to a survey commented that HWHP workshops increased their overall knowledge, awareness, appreciation and understanding of water quality topics and the curriculum and hands-on activities were applied to teaching of several thousand youth..

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
131	Alternative Uses of Land
132	Weather and Climate
133	Pollution Prevention and Mitigation
403	Waste Disposal, Recycling, and Reuse
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

Livestock producers will continue to gain knowledge and awareness of appropriate practices to manage livestock manure.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	450	14000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Individuals involved in public policy issues, animal production, and delivery of technical services for confined animal systems need on-demand access to the nation's best science-based resources. This information is critical

to preparing and implementing good public policy and to advising animal producers on nutrient and manure management decisions. In 2009, public policy specific to air quality associated with livestock systems surfaced with new EPA ammonia emissions reporting requirements and proposed greenhouse emission reporting rules. In addition, emerging water issues such related to antibiotics and endocrine disruptors are topics about which the animal industry and its advisors must maintain an awareness.

What has been done

Key activities in 2009 include: Nebraska faculty team (1) worked through eXtension to publish multiple resources and host national webinars on ammonia emissions reporting by animal feeding operations (eXtension web page on ammonia emissions reporting was the #1 viewed eXtension web page in January 2009); (2) installed additional Vegetative Treatment Systems (VTS) on small animal feeding operations (36 in total in Nebraska) and conducted tours and trainings on this technology, (3) led maintenance of the national eXtension web site on animal manure issues resulting in about 250,000 page views and hosted monthly web cast workshops, each of which is attended on average by 1240 participants that influence decisions made by 180,000 producers.

Results

Key accomplishments in 2009 include: (1) Ammonia emissions reporting webinars shared information with producers representing 3.3 million head of cattle and received high praise from EPA Region 7 Agricultural Advisor and Nebraska Emergency Response commission director; (2) VTS technology demonstrations and trainings educated technical service providers that annually consult with 2,000 animal producers representing 790,000 cattle; and (3) a 2009 eXtension evaluation survey for the animal manure resources concluded that the collective U.S. expertise shared through eXtension reach a national audience to an unprecedented degree not achieved by any other traditional educational delivery methodologies and that clientele is using LPELC resources in ways that influence both producer management decisions and implementation of public policy that are generally agreed as improving water quality.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
403	Waste Disposal, Recycling, and Reuse
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

Livestock producers will develop comprehensive nutrient management plans (CNMPs) and use best management practices for livestock manure handling and storage.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	300	132

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Nutrient management plans (NMPs) are the foundation for environmental stewardship in livestock operations. NMPs are an essential expectation for cost share assistance through NRCS and required for USEPA and state of Nebraska permitting programs.

What has been done

A team of extension specialists and educators conducted two 2-hour distance learning workshop to re-certify livestock producers to meet Land Application training requirements. These programs were attended by 55 producers by traveling to a local extension office or from their home or office computer. An additional 77 newly permitted producers attended a 5-hour workshop presented by distance learning technology on Land Application Training to also meet state regulations. The skills taught include regulations, identifying manure setback locations, preparing and implementing a nutrient plan, identifying record needs, P-Index implementation.

Results

Certification training is reported as improving regulation compliance (94% of participants), reduces fertilizer expenses (76% of participants reporting annual savings of \$10,300), and improves critical manure management skills such as P-Index application (97% of participants), improved nitrogen management (99% of participants), and better records (96% of participants). The 135 participants represented 211,000 head of livestock and 105,000 acres of cropland.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
121	Management of Range Resources
131	Alternative Uses of Land
133	Pollution Prevention and Mitigation
403	Waste Disposal, Recycling, and Reuse
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

Outcome #5**1. Outcome Measures**

Nebraska farmers will increase their knowledge and awareness of how integrated pest management and pesticide best management practices can help protect water quality.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	2000	6100

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

A variety of pest problems occur in Nebraska, including insects, weeds and plant diseases. Economically important pest species may vary by location within state and by year. Users of IPM need skills to identify and assess pest problems, and make intelligent management decisions, taking into account relevant economic, environmental, and health issues. The diversity of cropping systems and environments across Nebraska challenges faculty to identify site-specific IPM systems for adoption. In addition, genetically modified crops have presented new opportunities for reducing pesticide use and created new challenges for minimizing emergence of resistant weeds and insects.

What has been done

Sample pest management Extension programs include 1) 3,475 private pesticide applicators and 2,629 commercial and non-commercial applicators were certified in 2009 at Extension educational event using Extension curriculum that emphasized IPM, water quality, and personal safety and health risk protection (2) Northeast Crops/IPM weekly newsletter is received by 565 recipients and is viewed 2,450 times per month on average; and (3) Publishing of an annual Guide to Weed Management in Nebraska to provide research-based information on safe and effective application of herbicides and other pesticides which is distributed to every private and commercial pesticide applicator in Nebraska over a 3-year period; (4) Urban Pest Management Professionals conference targeting continuing education on offering commercial pest control topic including public health and environmental protection was attended by 192 individuals.

Results

Sample outcomes or impacts include: (1) private pesticide applicators always implementing 10 recommended practices between 66% and 93% of the time for water quality safety, IPM implementation, and/or personal protection; (2) clientele of Northeast Crops/IPM weekly newsletter reporting direct benefits of approximately \$3.9 million from timely weed control, reduced insecticide use, yields saved by better soybean aphid control, reduced fertilizer rates and reduced irrigation costs (since newsletter inception in 1983); and (3) users of the Guide to Weed Management in Nebraska reporting benefits averaging \$5.15 per acre. Over any three year period, it is believed that recommendations in the guide impact decisions on almost all of the 18 million crop acres in Nebraska. Two-thirds of those surveyed have used this guide for more than five years with 57% of users reporting frequent application of guide recommendations. The most frequently applied information in the Guide includes information on herbicide efficacy (86% of users), herbicide rate (85% of users) and herbicide restrictions (72% of users); (4) Post conference evaluation of the Urban Pest Management Professionals (PMPs) conference suggested knowledge improvements relative to IPM practices (100% of participants), pesticide regulations (86% of participants), and pesticide safety procedures (68% of participants)

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry
131	Alternative Uses of Land

133	Pollution Prevention and Mitigation
403	Waste Disposal, Recycling, and Reuse
605	Natural Resource and Environmental Economics

Outcome #6

1. Outcome Measures

Nebraskans will gain increased awareness and knowledge of natural resources including wildlife, forest resources and rangeland and the relationship between natural resources stewardship, sustainability, economic viability and the environment.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	5000	16500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nebraska natural resources are critical to sustaining the state's population and economy. Approximately 50% of the state's land is pasture or rangeland and nearly 40% is crop land which is the foundation for a \$12 billion agricultural economy (2006) and a rapidly expanding ethanol industry. The water resources sustain production on 50% of the cropland resources. The land and water resources also support a myriad of biological resources critical to outdoor recreation. Energy is also emerging as a critical issue to Nebraska with the developments in biofuels and wind energy.

What has been done

Extension provides a wide variety of activities in 2009 including: (1) wind energy development and land owner rights workshops (2) 57 Nebraska Game and Parks Commission employees, county/city employees, and contractors participated in Extensions Onsite Wastewater Certification Classes in 2009; (3) Extension educators in the Nebraska Panhandle piloted the Pine Ridge Teacher's Institute with 10 K-12 educators with a focus on natural resources education focused on health of rangelands, forests, streams, and agricultural lands (4) 2008-2009 High Plains Ranch Practicum which engaged 22 participants holistic ranch management skills over an eight day, five session course focused on economic and natural resource sustainability topics.

Results

In 2009, Extension natural resources workshops not included in Outcomes 1-5 that were attended by 16500 learners and delivered almost 37,000 learner-hours of educational experiences. Some critical outcomes from Extension education include: (1) Establishment of the Saline County Wind Association negotiating on behalf of 240 land owners with wind energy developers; (2) Education of Onsite Wastewater participants responsible for managing over 900 onsite systems in 87 parks as well as countless other municipal and private systems; (3) Providing natural resources education curriculum specialists with the curriculum based tools used by six interviewed participants with 1,600 youth during the following academic year (the Pine Ridge Teacher's Institute); and (4) Participants of the High Plains Ranch Practicum indicated knowledge gained would influence management of 7,800 beef cattle and 170,000 acres of land. Producers estimated economic value of knowledge

gained to be \$195,000.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry
131	Alternative Uses of Land
132	Weather and Climate
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
141	Air Resource Protection and Management
403	Waste Disposal, Recycling, and Reuse

Outcome #7

1. Outcome Measures

Consumptive water use by irrigated crops will be reduced. The outcome measure will be the percent reduction of estimated consumptive water use when the current year is compared to the estimated consumptive water use in calendar year 2006. The consumptive water use will be estimated using the irrigation water pumped in Natural Resources Districts that require the use of water measurement devices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	5	20

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to the USDA 2007 Farm and Ranch Irrigation Survey, Nebraska irrigates approximately 8.45 million acres with more than 6.70 million acre-feet of water annually. This represents a 11% increase in acres irrigated with 21% less water. This change is likely a result of both difference in rainfall patterns and concerted efforts promoting efficient irrigation water use. In 2004, state policy established a process for defining watersheds as a fully or over-appropriated. Part or all of eleven Natural Resource Districts are currently defined as fully or over-appropriated. Over-appropriated basins are required to reduce water use to 1997 levels. Discussion continues on defining additional areas of Nebraska as over or fully appropriated. State public policy continues to emerge and change annually on a variety of topics related to water use by irrigation.

What has been done

2009 irrigation water use extension programs were attended by 1,600 learners resulted in more than 4,800 learner hours of education delivered through approximately 90 workshops. UNL Extension initiatives include educational conferences (e.g. Irrigation and Energy Conservation Workshops) and field days (e.g. 9 on-farm demonstrations and 10 field days in the Republican River watershed) and on-farm research (e.g. Nebraska Agricultural Water Management Demonstration Network-NAWMDN). NAWMDN continues to grow into a robust on-farm extension initiative demonstrating irrigation water savings through in-field ET and soil moisture monitoring. A growing number of Natural Resource Districts support this extension led initiative by cost-sharing on instrumentation followed by Extension training farmers on its application.

Results

Currently proven technologies and management practices continue to demonstrate the potential to reduce statewide irrigation water pumped by 2 inches (or 460 billion gallons per year) or more and energy use by 42 million gallons of diesel fuel equivalent per year or more. In addition, for every acre-inch of water not pumped, we benefit from 55 pounds of reduced CO2 emissions creating a current potential for a 490,000 tons of reduction in CO2 emissions. The USDA 2007 Farm and Ranch Irrigation Survey shows a reduction in water use between 2003 and 2007 of 21% despite a 11% increase in total irrigated acres. The survey further suggests that the number of farms using water conserving technologies promoted by Extension is growing. For example, soil moisture sensing application has grown from 8.4 to 14% and daily ET reports from 19 to 30% between 2003 and 2007. Separate data collected from 6 NRDs on 2.2 million irrigated acres suggests that water use has dropped by more than 25% in five years. These reductions are a result of extension education, public policy pressure, and changes in rainfall patterns.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
132	Weather and Climate
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

Outcome #8**1. Outcome Measures**

Nebraska will not exceed its allocation of water in the Republican River as allowed by the interstate compact with Kansas and Colorado. Nebraska's allocation is 49% of the average annual water supply. The output measure will be the percent of the Republican River average annual water supply used by Nebraska.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	49	47

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

The Republican River Compact allocates the water supply of the Republican River, originally set at 11% to CO, 49% to NE and 40% to KS. 2008 consumptive use estimates suggest the Nebraska was under its allocation by 78,000 acre-feet. For the five year running average, it exceeds its allocation by less than 200 acre-feet. Natural Resource Districts have developed plans that are contributing towards achieving the targeted allocation than includes retirement of irrigated acres, improvements in efficiency of irrigation water use, and limitations on irrigation development. These reductions are a result of extension education, public policy pressure, and changes in rainfall patterns.

What has been done

Our West Central Research and Extension Center conducts research and field demonstrations that targets agricultural systems relevant to the Republican River Basin. A 2009 Conference and Open House on Improving Crop Water Productivity offered a unique opportunity for farmers and policy makers to learn and see irrigation practices and cropping systems on a farm scale that maintain or increase crop production while conserving water. The conference highlighted residue management research and education targeting reduced evaporation and water savings, maximizing efficiency with center pivot irrigation, ET and soil moisture tools for farm application and other topics. It was held at the newly acquired West Central Water Resources Field Laboratory where farm scale research and demonstrations can be implemented on systems applicable to Western Nebraska. Finally, UNL Extension hosted 9 field demonstrations, with 10 field tours at the sites, to teach irrigation options under Republican River basin conditions.

Results

The Republican River basin demonstrations and field days were attended by 225 people. They reported that as a result of the educational program: (1) the average irrigation water the farmers think they can save is 2.7 acre-inches/acre; (2) \$19.41 per acre was the average reported value of the knowledge the producers gained, and (3) 96% of the farmers plan to improve their management based on the knowledge and/skills learned. The farmers participating in this educational program series reported managing an average of 1448 acres of irrigated cropland per farm which translates to an average producer savings of \$28,000 and 3900 acre-inches of water. These results are contributing to an observed reduction in consumptive water use and are partially responsible from consumptive use exceeding allocated use by 11 to 21% in 2003 through 2006 and being below allocated use by 5% in 2009. Rainfall patterns also contributed NE use being less than allocated in 2009.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities

Brief Explanation

Natural disasters: Drought conditions continue to diminish in 2009. Only limited areas in southeastern Nebraska were abnormally dry during most of the 2009 growing season or in moderate drought during part of the growing season. National Weather Service prediction is for drought conditions to be unlikely through June 2010

Economy: 2009 was a year of moderating crop costs and prices for crops and generally positive economic conditions for crop producers. The recession and trade protection policies of many key trading partners have severely dampened demand for meat products causing significant losses within all animal production sectors. Some signs of easing trade restrictions, improving economy and reduced animal product supplies is creating the first signs of optimism in the animal industry.

The continued strength of the corn-based ethanol industry has brought significant economic development and income potential to many rural areas. A temporary correction in the feasibility of corn ethanol fuels slowed ethanol production in 2008 but the industry has regained strength in 2009. The one concern that may limit this potential is west coast state's public policy and controversial accounting procedures of carbon footprint of corn-based ethanol. California is the number one importer of Nebraska ethanol, a market that could end in 2010. Nebraska ethanol plants consume 600 million bushels of grain, produce 1.8 billion gallons of ethanol, and have represent a \$1.4 billion capital investment in Nebraska.

Public policy and Government Regulations: Public pressure by the Human Society of the US is causing significant concerns among all agricultural organizations. Policy implementation in California and other states sponsored by HSUS is seen as promoting economically unsustainable animal agricultural practices in the US by agricultural organizations.

Appropriation Changes: Reduced state tax collection has led to university budget reductions over the past year with greater reductions in 2011 when stimulus funds are no longer available to balance state budgets. Additional elimination of some research and extension program areas is anticipated.

Competing public priorities: A customer base that has little connection and no understanding of modern agricultural production systems and values of the farming community and a desire to use public policy to design agricultural systems is very frustrating to the agricultural community. Some aspects of this public oversight of food production is seen as beneficial such as local foods production and organic systems because of potential for premium prices. However, the lack of acceptance by some groups of many production technologies for reducing inputs (e.g. pesticide inputs with use of genetically modified seeds) or increasing production efficiencies and yields (e.g. use of antibiotics and growth promotants in animal production) comes at the same time that society is asking for greater production to meet a growing food and energy feedstock need. These competing public priorities are leaving farmers frustrated with the meddling by customers and policy makers that the agricultural community believes to be poorly informed.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)

Evaluation Results

UNL Extension has divided into five spires of excellence with one specifically targeting agriculture and natural resource issues: 1) Water Climate and the Environment for Agriculture and 2) Water Climate and the Environment for Communities. The Action Team supporting each spire has identified one or more "Signature Programs" that first became active at the start of 2010. The "Signature Programs" will be delivered statewide and establish methodologies for measuring statewide impact. The faculty team supporting each spire is in the process of developing or adapting statewide evaluation tools targeting clientele outcomes identified in the statewide action plans. These tools will target educational program evaluation and provide a means of estimating knowledge gain, intended practice change, and likely conditional changes. These tools supporting these "Signature Programs" should be in place by July 1, 2010, begin collecting data for the second half of 2010, and serve as the foundation of our Extension systems measurement of impact for the next several years.

Key Items of Evaluation

Impact indicators and supporting statewide survey are being completed for one to three Signature Programs (initiated for 2010) associated with each Action Team. The preliminary statewide measures of impact that will be utilized for the next several years are as follows:

Agricultural Water Management (Water, Climate, and Environment Action Team)

Survey clientele current management practices and dollars saved from new practices adopted
NASS agricultural statistics and NRD water use records.

Agricultural Manure Management (Water, Climate, and Environment Action Team)

Survey clientele on current management practices and dollars saved from practice changes.
Assemble NDEQ records of compliance.

Maintain and Improve Community Water Quality/Quantity (Water, Climate, and Environment Action Team)

Practice changes that lead to conservation of water quality and quantity.
Financial savings for homeowners, businesses and industry.

Resource Efficient Community Landscapes

Practice changes that lead to conservation of water quality and quantity.
Financial savings for homeowners, businesses and green industry.

V(A). Planned Program (Summary)**Program # 3****1. Name of the Planned Program**

Viable Communities and Appropriate Quality of Life for Individuals and Families

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
607	Consumer Economics	1%		1%	
608	Community Resource Planning and Development	5%		0%	
701	Nutrient Composition of Food	12%		7%	
702	Requirements and Function of Nutrients and Other Food Components	12%		20%	
703	Nutrition Education and Behavior	10%		7%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	14%		12%	
721	Insects and Other Pests Affecting Humans	1%		1%	
722	Zoonotic Diseases and Parasites Affecting Humans	1%		0%	
723	Hazards to Human Health and Safety	6%		5%	
724	Healthy Lifestyle	1%		3%	
801	Individual and Family Resource Management	4%		0%	
802	Human Development and Family Well-Being	14%		25%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	4%		9%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	4%		3%	
805	Community Institutions, Health, and Social Services	1%		3%	
806	Youth Development	10%		4%	
	Total	100%		100%	

V(C). Planned Program (Inputs)**1. Actual amount of professional FTE/SYs expended this Program**

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	90.0	0.0	15.0	0.0
Actual	75.0	0.0	16.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c 1979921	1890 Extension 0	Hatch 305471	Evans-Allen 0
1862 Matching 1919893	1890 Matching 0	1862 Matching 286382	1890 Matching 0
1862 All Other 18963972	1890 All Other 0	1862 All Other 7458034	1890 All Other 0

V(D). Planned Program (Activity)**1. Brief description of the Activity**

The institute will conduct research and deliver extension education programs that will enable Nebraskans to strengthen their families and communities. Output efforts will help reduce food-borne illness, increase healthy eating and active behaviors, increase number of self-confident community leaders and increase the number of communities with access to tools to aid economic development, i.e. entrepreneurship.

Increasingly, learners lead time-pressed lives and want to access educational information at their convenience. While face-to-face teaching remains an ongoing focus of our efforts, many learners may choose to access educational information online through Internet sites, module learning and ask-an-expert. Therefore, we will employ a blend of teaching strategies to accomplish our educational goals and research of reaching individuals who want just-in-time research-based information and in depth behavior changing educational experiences.

2. Brief description of the target audience

Our targeted audiences include:

1. Food processing and retail establishment owners and staff
2. Children, youth and families
3. Youth and adults in community leadership roles
4. Entrepreneurs
5. Local and state decision makers

V(E). Planned Program (Outputs)**1. Standard output measures**

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	10000	20000	50000	20000
Actual	12000	20000	50000	20000

2. Number of Patent Applications Submitted (Standard Research Output)**Patent Applications Submitted**

Year: 2009

Plan: 0

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	10	10	
Actual	10	71	81

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- 1) Number of scholarly publications and outputs related to viable communities and appropriate quality of life for individuals and families projects accepted.

Year	Target	Actual
2009	20	71

Output #2

Output Measure

- 2) Number of extension in-depth community, family and Individual topic-related educational workshops.

Year	Target	Actual
2009	100	100

Output #3

Output Measure

- 3) Number of extension community, family and individual program-related curricula, publications and other educational resources developed.

Year	Target	Actual
2009	10	10

Output #4

Output Measure

- 4) Number of Agricultural Research Division projects that focus on community and appropriate quality of life for individuals and families issues.

Year	Target	Actual
2009	20	30

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	<p>Nebraska's will gain knowledge to make effective choices about their health, wellness and diet. The long-term goal of reducing obesity and increasing physical activity of children is essential.</p> <p>Individuals will increase knowledge of food selection and preparation with reduced fat and/or calories, USDA serving sizes and importance of adequate time spent in physical activity each day and increased understanding of the relationships between diet and physical activity to improve personal health.</p> <p>Individuals will select, prepare and eat recommended amount of fruits, vegetables, low-fat proteins and dairy and whole grains. In addition, individuals will better balance their intake of calories with their energy expenditures.</p>
2	<p>Nebraska's communities will have access to the tools they need to retain current residents and businesses and create opportunities for new residents and businesses. Community leaders and business owners will understand the importance of strategic planning, support business development techniques and information technology to support community's development.</p> <p>Businesses within communities will work to be more profitable, entrepreneurs will be supported by the communities and informational technology will be used effectively to support community growth.</p> <p>Communities will have planned for the future, new entrepreneurial businesses will have been created, and informational technology will be used to create partnerships between the community's public and private sectors.</p>
3	<p>Nebraska's youth will be informed decision makers and remain active members of their communities as they reach adulthood. This will be measured by surveys, interviews and case studies to document evidence of the benefits (impact) to a community for involving youth in the decision making process. Nebraska will have evidence of the roles and responsibilities that youth are assuming at the community level such as being included on community agendas, leading community decisions and helping establish community policies.</p> <p>Community members will have an increased understanding of how youth can engage with adults in a community decision making process to solve problems impacting their communities.</p> <p>Youth and adults will report improved decision making and problem solving skills. The number of youth engaged as partners in community civic activities will increase.</p>
4	<p>Food handlers will practice safe food handling procedures to reduce food-borne illness outbreaks. This will be measured by comparing annual Nebraska statistics from Nebraska Health and Human Services (NHHS) for reduced incidents of food-borne illness because of safe food handling, decreased medical costs due to food-borne illness outbreaks and decreased days lost from work.</p> <p>Food handlers (food service workers, food processors and livestock producers) will increase their knowledge of safe food handling practices measured by increased knowledge about adequate food handling and preparation and animal management practices.</p> <p>Food handlers will implement safe food handling practices for the reduction of food borne illnesses because of strategies learned through ServSafe, HACCP and Quality Assurance.</p>
5	<p>Families will contribute to community viability and maintain sustainable lifestyle to provide a safe and secure future for their children.</p> <p>Long-term: Families will increase financial assets by decreasing debts.</p> <p>Intermediate: Individuals and families will (1) establish long-term financial goals to guide decision making, (2) will decrease spending, and (3) will practice saving regularly.</p> <p>Short-term: Individuals and families will (1) evaluate spending patterns, (2) identify income and expenses, (3) make and implement a budget, and (4) develop and implement a savings plan.</p>

Outcome #1**1. Outcome Measures**

Nebraska's will gain knowledge to make effective choices about their health, wellness and diet. The long-term goal of reducing obesity and increasing physical activity of children is essential. Individuals will increase knowledge of food selection and preparation with reduced fat and/or calories, USDA serving sizes and importance of adequate time spent in physical activity each day and increased understanding of the relationships between diet and physical activity to improve personal health. Individuals will select, prepare and eat recommended amount of fruits, vegetables, low-fat proteins and dairy and whole grains. In addition, individuals will better balance their intake of calories with their energy expenditures.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	500	500

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

The combination of rising health care costs, the economic downturn, and staggering statistics related to lifestyle behaviors that have negative consequences on long-term health make preventative health care and the adoption of healthy living choices critical. These kinds of changes can reduce chronic disease, reduce family health care costs, and contribute positively to the state's economy.

What has been done

Health education (i.e., increasing physical activity, choosing healthier foods), is a critical part of the work of UNL Extension. Programs reach clientele in a variety of ways. For example, Small Steps to Health and Wealth directly targets clientele through a combination of face-to-face and on-line learning. The Diabetes for Life program targets diabetics with strategies for controlling the disease and for saving on health care costs. Educational programs offered through 4-H use experiential learning methods to help young people increase their physical activity levels, choose healthier beverages, and increase their intake of fruits and vegetables.

Results

Evaluation results from one example program, Small Steps to Health, indicate that as a result of the 13-week program, participants ate healthier, lost weight, had preventative health screening, joined exercise facilities, planned weekly meals and grocery lists, and reduced eating out.

Based on pre- post-tests, participants in the Diabetes for Life program changed their behavior at the ($p < .05$) level on all 18 points tested. The greatest changes were related to: using basic diabetes self management techniques to control blood sugar levels; using a variety of techniques to strengthen self control; distributing daily carbohydrate allocation evenly throughout the day; and exercising three times a week.

Young people involved in 4-H Healthy Lifestyles programs are making healthier choices. The Annual Nebraska 4-H Impact Study ($n = 1,300$) shows that 100% of youth were able to identify ways to live a healthier life. The top three responses included; 1) drinking less soda; 2) eating more fruits and vegetables; and 3) increasing the

amount of exercise they get each day. In addition, 83% of 4-H club members identified that it is best to choose water over juice and sports drinks.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
724	Healthy Lifestyle
801	Individual and Family Resource Management
802	Human Development and Family Well-Being

Outcome #2

1. Outcome Measures

Nebraska's communities will have access to the tools they need to retain current residents and businesses and create opportunities for new residents and businesses. Community leaders and business owners will understand the importance of strategic planning, support business development techniques and information technology to support community's development. Businesses within communities will work to be more profitable, entrepreneurs will be supported by the communities and informational technology will be used effectively to support community growth. Communities will have planned for the future, new entrepreneurial businesses will have been created, and informational technology will be used to create partnerships between the community's public and private sectors.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	15	15

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The vitality of all Nebraska communities, regardless of size, is critical to our state. Youth and adults who have an entrepreneurial mindset are ready to take risks and have the skills needed to succeed in creating a business, wherever they choose to live. Entrepreneurs have the opportunity to return to rural areas and contribute to Nebraska's economy.

What has been done

Entrepreneurship Investigation (ESI) is a program designed to help young people gain the skills necessary to start and operate their own business. Through in-depth camping experiences and multi-day workshops, youth develop a business and marketing plan, produce their product, sell their product, and assess the profit/loss. Plans are underway to translate the program into Spanish for use in Costa Rica and into Portuguese for use in Portugal. Another program designed to help small businesses, is NebraskaEDGE. The goal of The NebraskaEDGE is to

deliver high-quality entrepreneurship training to new and existing business owners.

Results

ESI program participants report significant changes in their knowledge of developing a business plan and assessing the viability of a business. Nearly three-fourths (73%) of the youth felt good about their business idea and website.

Of the over 1,300 4-H club members who responded to the Annual Nebraska 4-H Impact Study, 65% report learning skills in 4-H that could help them start a business and 94% report learning skills they could apply in a future job.

A 5-year evaluation of NebraskaEDGE showed 62% of individuals who had a start-up business and 52% of individuals who had an existing business when they enrolled in EDGE now have businesses that provides them with a higher standard of living. In addition: 75% developed goals and objectives for their business; 71% completed their business plan; 35% expanded their businesses sales, with an average increase of \$221,371; and 51% said their EDGE training had provided them with a higher standard of living.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
608	Community Resource Planning and Development
801	Individual and Family Resource Management
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
805	Community Institutions, Health, and Social Services

Outcome #3

1. Outcome Measures

Nebraska's youth will be informed decision makers and remain active members of their communities as they reach adulthood. This will be measured by surveys, interviews and case studies to document evidence of the benefits (impact) to a community for involving youth in the decision making process. Nebraska will have evidence of the roles and responsibilities that youth are assuming at the community level such as being included on community agendas, leading community decisions and helping establish community policies. Community members will have an increased understanding of how youth can engage with adults in a community decision making process to solve problems impacting their communities. Youth and adults will report improved decision making and problem solving skills. The number of youth engaged as partners in community civic activities will increase.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
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2009

100

250

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Preparing young people to step up to the challenges of a complex, changing world is critical to the long-term vitality of Nebraska. Empowering young people to take on leadership roles and realize how they can make a difference in their communities can help them stay connected and choose to remain in the state.

What has been done

On-going program efforts encourage youth to take on leadership roles and become involved in their communities. The Hastings Youth Leadership Academy is one example. This program, which began in 1991, is a nine-month program where youth leaders interact with business and community leaders; form alliances with city officials on public policy issues; and learn the skills needed to effectively communicate their needs to local decision makers.

Results

Before- and after-skill assessments of attendees in the Hastings Youth Leadership Academy show that 90% of youth feel they have increased communication skills; 100% have increased organization skills; 95% feel they can plan and carry out a project; 100% increased team building skills; and 80% feel confident to speak at a public event on behalf of community youth. Four-year follow-up evaluations with graduates yield the following comments: I learned to communicate like a leader; I am not afraid to voice my opinion about the needs of youth in my community or in my state; I know what personal ethics mean; I worked with kids from other schools instead of competing against them; and I know how to be a good leader.

Young people in the 4-H program are also taking on leadership roles in their communities. The Annual Nebraska 4-H Impact Study (n = 1,300) shows that 78% of youth in 4-H clubs are comfortable leading group discussions; 96% report taking personal responsibility for their actions; 91% participate in community service projects, and 53% serve on a community committee or board.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #4

1. Outcome Measures

Food handlers will practice safe food handling procedures to reduce food-borne illness outbreaks. This will be measured by comparing annual Nebraska statistics from Nebraska Health and Human Services (NHHS) for reduced incidents of food-borne illness because of safe food handling, decreased medical costs due to food-borne illness outbreaks and decreased days lost from work. Food handlers (food service workers, food processors and livestock producers) will increase their knowledge of safe food handling practices measured by increased knowledge about adequate food handling and preparation and animal management practices. Food handlers will implement safe food handling practices for the reduction of food borne illnesses because of strategies learned through ServSafe, HACCP and Quality Assurance.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	2000	2000

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

Because of Nebraska's agricultural economy, a safe and secure food supply is vital to consumers, producers, processors, and the entire state. Safe food handling result in reduced food borne illnesses and the associated health care costs.

What has been done

To better serve the needs of food processors, educational programs on HACCP planning and implementation was provided for over 300 individuals in Nebraska, South Dakota, and California. In addition, one workshop was delivered in cooperation with Ohio State University for addressing control of *Listeria monocytogenes* in ready to eat meat products. Introductory Food Safety Training for Poultry and Meat Plants Producing Ready-to-Eat Products was conducted for 30 employees at three different very small businesses. In addition, one-on-one assistance was provided to twenty five small meat processing businesses.

A video was developed demonstrating the sampling of beef carcasses for *E. coli* O157:H7 and was linked to the UNL food safety web site. In addition, two NebGuides were written on Standard Operating Procedures. One for Standard Operating Procedures for Sampling Beef Lean Trimmings for *E. coli* O157:H7 and one for Standard Operating Procedures for Sampling Beef Carcasses for *E. coli* O157:H7.

Food service employees continue to be a target audience with UNL Extension providing 16 hours of training on ServSafe to over 500 food service employees annually. In addition, on-going training is provided for occasional quantity cooks, school cooks, and daycare providers.

In addition, quality assurance is required for all youth showing meat animals through 4-H.

Results

As a result of Extension programming, processors increased their knowledge about the regulations for control of *Listeria monocytogenes* in ready to eat meat products. Two processors have indicated they have adopted the use of antimicrobial ingredients in their products to reduce the risk of listeriosis.

A 90% pass rate was obtained for the certification exam for ServSafe Program participants. Surveys show that individuals who successfully complete the course increase their food safety knowledge and make safe food handling changes that reduce the risk of food borne illnesses. These food service managers impact, on the average, an additional 15 people in their establishments, meaning these individuals reached an additional 4,525 food service workers after completing ServSafe courses.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
721	Insects and Other Pests Affecting Humans
722	Zoonotic Diseases and Parasites Affecting Humans
723	Hazards to Human Health and Safety

Outcome #5**1. Outcome Measures**

Families will contribute to community viability and maintain sustainable lifestyle to provide a safe and secure future for their children. Long-term: Families will increase financial assets by decreasing debts. Intermediate: Individuals and families will (1) establish long-term financial goals to guide decision making, (2) will decrease spending, and (3) will practice saving regularly. Short-term: Individuals and families will (1) evaluate spending patterns, (2) identify income and expenses, (3) make and implement a budget, and (4) develop and implement a savings plan.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	100	100

3c. Qualitative Outcome or Impact Statement**Issue (Who cares and Why)**

The economic instability of the country has impacted both large and small communities statewide. Families who are better able to manage their finances are better able to care for their children and rely less on government resources resulting in a stronger state economy.

What has been done

Stakeholder input in Nebraska showed that because of the stigma around attending programs on financial issues and managing money, education on these topics might better be provided via distance education. To meet this need, UNL Extension re-focused its efforts around financial security and developed the Managing Tough Times website: <http://toughtimes.unl.edu/home>. In-depth educational resources focused on dealing with the high input costs of crop and livestock production, saving money for families and businesses, and opportunities to increase income.

Extension also partnered with the Nebraska Educational Television Network on the Recession Survival Guide, a series of television and on-line programs designed to help families better manage their resources. Topics included: Cutting Food Costs, Household Expenses, Energy Savings, Managing Money, and Handling Stress.

Results

The Managing Tough Times website had over 10,000 hits in the first eight months. In addition, follow-up programs based on requests generated from the Recession Survival Guide program resulted in 26 in-person programs that were attended by over 750 people.

The web-based Supermarket Savings module had over 13,900 page views during the first five months online; 94% (total n=207) of respondents to an online survey stated these tips will help them save money, with an average savings of \$17/week or close to \$900/year. Some of the tips participants indicated would be most helpful included: checking your garbage to see what you're tossing and how you can take steps to prevent this; buying and freezing meat when it is on sale; purchasing a reusable water bottle and filling it with tap water after they

discovered the cost of buying packs of bottled water over a period of time; and giving specific examples and showing the cumulative effect over time provided an incentive for making changes. As one respondent remarked, "I think pointing out the amount of savings for the year is eye-opening."

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes

Brief Explanation

Decreasing rural populations and growing urban communities continue to present economic and social challenges for Nebraska. Keeping young people attracted to Nebraska, especially to small communities is of high importance to the state.

While Nebraska's economy continues to be stronger than many states, the economic downturn has impacted job growth and spending which in turn impacts state budgets. Of special concern is the budget growth after the ending of stimulus monies.

In order to best meet the needs of clientele with available resources, continual stakeholder input is sought as to the most important program needs and most effective delivery methods. For example, programming related to financial security was altered to focus more on managing finance through difficult financial times. The delivery method was changed from in-person programs to on-line and television.

Continual focusing of program outcomes and the identification of signature programs is critical to Extension's role as being a premiere provider of research-based education.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- Case Study

Evaluation Results

Key Items of Evaluation

Statewide data collection using common indicators and instruments continues to be a goal of UNL Extension. The process, developed and currently being used in 4-H programs, is being replicated in other areas such as food safety, nutrition, and healthy lifestyles. The defining of signature outcomes by Extension Action Teams has served as a first step in the process. These signature outcomes will not only be useful in defining Extension's expertise in certain content areas, but will also allow for cross training based on subject matter. For example, educators teaching youth animal science programs may also address careers and select a career exploration outcome from the youth action team. This will result in more integrated programming that has more applicable meaning for clientele.