2014 University of Nebraska Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 06/15/2015

I. Report Overview

1. Executive Summary

The Institute of Agriculture and Natural Resources (IANR) is a part of the University of Nebraska-Lincoln and includes the divisions of teaching, research, and extension. Strategic planning is integral to IANR's function as a land-grant institution and it prides itself on working as an integrated system across the three mission areas. To ensure that IANR's priorities reflect the needs of the state's residents, there is on-going two-way dialogue between IANR and Nebraska residents. Within the past two years this strategic two-way dialogue moved to a new, higher plane as Vision for 2025 was rolled out. This visioning process was created because of the need to: determine how IANR will contribute to the critical need to double the world's food supply to feed nine billion people; address shifting climate and environmental conditions; respond to the increasing need for energy sources; and consider how to help increase economic income opportunities for communities. In Nebraska one in three jobs is directly tied to agriculture or agribusiness, and the state strives to increase job opportunities. As a result of the visioning process, the priorities of IANR became food, fuel, water, landscapes and people. Entrepreneurship is a cross-cutting thread of these five issue areas.

The "Vision for 2025" engaged key Nebraska government leaders, stakeholders, representatives of organizations, faculty, and students/youth. The process began with community listening sessions throughout Nebraska, discussions among faculty/administrative leaders, representatives of civic and community organizations and the agricultural industry; focus group discussions about specific topics such as the future of rural communities; and teams of faculty writing planning documents that were discussed at round-table discussions throughout the year. An underlying principle throughout the process was public input/dialogue. Long-term goals of IANR administrative units that support these priorities of food, fuel, water, landscapes, and people can be found at: http://go.unl.edu/t49a.

These priority outcomes of food, fuel, water, landscapes, and people are representative of the societal challenge areas of NIFA. For example, in the Nebraska planning process 'food" represents the continuum of farm to fork, which includes the basic life sciences, production, food security and hunger, childhood obesity, nutrition, and food safety. Landscapes represent the productivity and sustainability of climate, water, soil, and all of our natural resources. People represents the well-being of children, youth, and families as they interact with their environments.

The Institute of Agriculture and Natural Resources strives to meet the needs of its Nebraska citizens through engagement in internationally-recognized science and education. This mission is met by: advancing knowledge along a continuum from fundamental research to application; delivering education that addresses the current and emerging needs of the state's residents; and teaching tomorrow's professionals through formal and nonformal learning strategies. The ongoing cultivation of public-private partnerships helps make this mission more achievable.

The importance of integrating missions is most evident in the upward trajectory of grant/contract dollars received, the rigor of educational programs delivered in both formal and nonformal settings, and in the placement of graduates in their careers.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	220.0	0.0	180.0	0.0
Actual	214.0	0.0	132.0	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

During 2014 multiple approaches were used to engage both internal and external audiences of research and extension in the review of programmatic goals. External advocacy groups with broad statewide membership, such as Agriculture Builders of Nebraska and Family, Youth, and Community Partners, reviewed the strategic objectives that address food, fuel, water, landscapes, and people. These groups provided feedback and suggestions to the long-term goals. Each external advocacy group met at least three times during the year.

Research and extension continued their annual review of extension plans of work and Hatch projects. Faculty teams are in place for each of the Extension action plans (Animal Agriculture, Cropping Systems, Child and Youth Development, Community Vitality, Food-Nutrition-Health, Water and Environment). Teams are composed of educators and specialists working in each content area. Based upon the issues impacting the state and region, teams developed, delivered, and assessed the educational programs delivered. Additionally, each of the teams interacted with external stakeholders. These are stakeholders who are intimately involved in the subject matter areas included the content area of that action team; for example, action team members associated with food-nutrition-health met one-on-one and in small groups with industry representatives, dietitians, staff of the Nebraska Department of Agriculture, and Department of Health and Human Services. Faculty members of the Agricultural Research Division had their Hatch projects reviewed by a team of faculty and administrators as the projects came up for review. Significant programmatic funding was provided to multi-state Hatch projects after each was reviewed by both internal and external peers. State commodity check-off boards provided input as they assessed over 100 research and extension proposals. In Nebraska, many IANR tenured faculty have joint research/extension appointments; hence, their research and extension work is seamless.

III. Stakeholder Input

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

- Targeted invitation to traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Survey of traditional stakeholder individuals
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public
- Other (Development of public value statements for use by stakeholders to promote IANR programs)

Brief explanation.

Extension developed public value statements used by stakeholders to tell others of the impact/public value of Extension and then seek input for programmatic direction. (Go to: http://www.extension.unl.edu/makingadifference to see 'Making a Difference' impact summaries). Impact reports are available online and printed annually for each action plan (and related areas); each includes a public value statement, which helps stakeholders understand the value of and differences being made by today's Extension/research programs. Impact reports and public value statements are given to decision makers and extension board members to help guide their advocacy efforts on behalf of IANR at the local, regional, and national levels.

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.

Nebraska is a state in which the public is very engaged with its university; the number of individuals who each year step forward to engage with IANR is commendable. Research and extension's strategic relationships with local, state, and federal decision makers is valued. Advocacy groups, advisory groups for subject matter, departments, and research and extension centers, and extension boards are utilized to gather input. Farm organizations and industries related to agriculture routinely are at the planning table. In 2010, extension added a staff member to identify and encourage private/public partner engagement in developing educational endeavors; this has yielded working relationships with the transportation industry, and with companies seeking to work with local communities, plant sciences, and telecommunications. The Agricultural Research Division has multiple advisory committees that speak to the long-term goals for bench and translational science.

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.

One method of collecting input from stakeholder groups was through face to face meetings. Additionally, there was an ongoing effort on the part of Extension Boards to talk one-on-one with their neighbors and colleagues about needs within their geographic regions.

Extension is a partner with the 1994 land grant institutions in our state. Extension and the Nebraska Indian Community College (NICC) have had a continuous partnership to support the implementation and management of Tribal College Extension programs in three different NICC communities. IANR Extension faculty who work routinely with the Tribal colleges serve as a conduit to move content and planning information between these entities. Research opportunities are also being explored with these colleges.

The Nebraska Panhandle has both recent and longtime Hispanic residents. An Extension educator in the Scottsbluff area works with audiences and local planning groups to ensure a cross-cultural understanding. The program is in three parts: history of Mexican people in the Panhandle, cross-cultural communications, and formal education for audiences working with English language learners. This workshop is presented for public school educators, health professionals, students in education, health and human services employees, community leaders, chambers of commerce members, and companies. This is just one example of extension's engagement as a teacher for other organizations who seek increased understanding and involvement with all of our state's residents. In addition, Nebraska is working to increase the number of extension educators who can target diverse youth audiences. For example, a Spanish-speaking 4-H educator works specifically with underserved audiences in Northeast Nebraska; this educator reached over 5,900 people in the past year.

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.

Input from stakeholders is used to identify emerging issues for both research and extension, and to help set priorities. Stakeholders are also invited to provide input during the selection of administrators; for example, stakeholders serve as members of search committees for unit administrators, deans, vice chancellors, etc. Local stakeholders are invited to interview extension educators for positions located in their geographic regions.

Brief Explanation of what you learned from your Stakeholders

Stakeholders expect IANR and its divisions of research, extension, and teaching to keep focused on critical issues facing Nebraska. They expect the land grant institution to do cutting-edge work that is well regarded by the academy, has global impact, and is of value to Nebraska's residents and

economy. Stakeholders recognize that programming priorities must be established. During recent years, issues related to rural community vitality have surfaced and resulted in the University of Nebraska system establishing a Rural Futures Institute. This Institute has been complemented by a new Community Vitality Initiative (CIV) being launched within extension. The CVI has engaged more than 15 faculty from youth, agricultural, and entrepreneurship extension programs.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
5083424	0	4331201	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	4678732	0	3711569	0
Actual Matching	5083424	0	4421254	0
Actual All Other	0	0	0	0
Total Actual Expended	9762156	0	8132823	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	782267	0	943472	0

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Food Production/Security and Landscapes

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		9%	
111	Conservation and Efficient Use of Water	8%		9%	
112	Watershed Protection and Management	4%		5%	
132	Weather and Climate	5%		3%	
133	Pollution Prevention and Mitigation	4%		6%	
136	Conservation of Biological Diversity	0%		3%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		8%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	3%		5%	
205	Plant Management Systems	23%		4%	
206	Basic Plant Biology	0%		4%	
211	Insects, Mites, and Other Arthropods Affecting Plants	4%		5%	
212	Diseases and Nematodes Affecting Plants	3%		8%	
213	Weeds Affecting Plants	4%		5%	
301	Reproductive Performance of Animals	1%		3%	
302	Nutrient Utilization in Animals	1%		6%	
305	Animal Physiological Processes	0%		5%	
307	Animal Management Systems	28%		3%	
311	Animal Diseases	2%		5%	
601	Economics of Agricultural Production and Farm Management	9%		1%	
605	Natural Resource and Environmental Economics	1%		3%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	169.0	0.0	157.0	0.0
Actual Paid	129.0	0.0	115.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
2991575	0	3176620	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
3081254	0	3983266	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

• Conduct foundational research in the basic sciences that underpin and will support future productivity and sustainability advances in agriculture and Nebraska's environmental resources.
• Conduct research and extension programs to develop/deliver new and improved crop and livestock integrated management programs that increase the potential for improved agricultural productivity.
• 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 that will help characterize and maintain the High Plains ecosystem, and better understand the potential impacts of climate variability and change.
• Conduct research and extension programs that help citizens mitigate the impact of water stress (excess and insufficiency).

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 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 and climate issues. The program will provide agency staff with the knowledge they need to carry out the agency responsibilities and mandates.

3. How was eXtension used?

eXtension continues to serve as a valuable resource for clients and faculty. For subject areas outside of our seven action teams, it provides a primary Web resource used by faculty and clientele for land grant

university information. For example, eXtension is our primary land grant Web resource for subject areas such as dairy, farm safety, freshwater aquaculture, goats, and grapes, all topic areas for which UNL Extension provides little or no Web content. In addition, all UNL Extension websites link to eXtension, and eXtension serves as a resource for faculty in answering questions and providing supplemental resources for face-to-face training sessions.

In 2013 (Nebraska faculty supported 14 subject-focused "Ask an Expert" systems and answered 135 Ask an Expert questions that originated from Nebraska. A total of 417 responses were supplied by UNL Extension faculty through the national eXtension "Ask an Expert" systems. Extension has 281 faculty and staff with eXtension IDs, Faculty are represented as members on 55 of 76 CoPs including 22 who provide leadership for CoPs.
Examples of eXtension initiatives led by Nebraska faculty include: 1) Animal Agriculture in a Changing Climate is an eXtension initiative that resulted in the development and delivery of a national online course titled Animal Agriculture in a Changing Climate (http://animalagclimatechange.org/free-online-course/). A national team of land grant university experts was assembled for authoring and pilot testing of the course. 2) In addition, two eXtension communities of practice, Livestock and Poultry Environmental Learning Center and Animal Agriculture in a Changing Climate, cooperated to host the second Livestock Waste to Worth National Conference (held March 31, 2015 in Seattle).

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	33500	1294000	1700	68000

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

Patent Applications Submitted

Year:	2014
Actual:	22

Patents listed
Patent Title
Filing Date;Application No.;Application; Type;Status
Methods and Compositions for Obtaining Useful Plant Traits
9/24/2014;EP14186459.5;EPO - European Patent Office;Active - Pending

Genetic Markers for Susceptibility to Porcine Circovirus 2 Associated Disease9/26/2014;62/056,416;PRV - Provisional;Active - Pending

Methods and Compositions for Obtaining Useful Plant Traits
9/24/2014;14/495,498;119 - US from PRV or PCT Foreign Prior;Active - Pending

Improved Epigenetic Lines
8/25/2014;62/041,227;PRV - Provisional;Converted

Methods and Compositions for Obtaining Useful Plant Traits
8/7/2014;14/454,518;119 - US from PRV or PCT Foreign Prior;Active - Pending

Method for the Production of a High Saturate, Low Polyunsaturated Soybean Oil
8/1/2014;62/032,273;PRV - Provisional;Active - Pending

SEC23 Nucleic Acid Molecules That Confer Resistance To Coleopteran And Hemipteran Pests
5/6/2014;61/989,170;PRV - Provisional;Active - Pending

Plants with Improved Traits
5/14/2014;61/992,945;PRV - Provisional;Active - Pending

Chemical Methods for Obtaining Useful Plant Traits
5/1/2014;61/987,084;PRV - Provisional;Active - Pending

Methods and Compositions for Obtaining Useful Composite Plants
4/24/2014;61/983,520;PRV - Provisional;Active - Pending

Improvement in Renewable Methane Yield from Anaerobic Digestion
4/17/2014;61/980,656;PRV - Provisional;Active - Pending

Improved Method for Epigenetics
4/16/2014;61/980,096;PRV - Provisional;Active - Pending

Method of Breeding the Epigenome
3/26/2014;61/970,424;PRV - Provisional;Converted

A Method for Development of a Porcine Reproductive and Respiratory Virus Vaccine Strain Capable of Inducing Broad Protection
3/21/2014;61/968,465;PRV - Provisional;Active - Pending

Improved Epigenetic Lines
1/23/2014;61/930,602;PRV - Provisional;Converted

Drought Adaptive Root Gene in Wheat - I & II
2/13/2014;61/939,329;PRV - Provisional;Converted

Plants with Useful Traits and Related Methods
3/18/2014;2014-509380;FOR - Foreign;Active - Pending

Plants with Useful Traits and Related Methods
12/26/2013;201280031753.8;FOR - Foreign;Active - Pending

Plants with Useful Traits and Related Methods
10/31/2013;14/114,945;FOR - Foreign;Active - Pending

A method for Improved Plant Inbred Lines
11/7/2013;61/901,349;PRV - Provisional;Converted

Movable Center Pivot Fence for Cattle
11/5/2013;14/071,761;119 - US from PRV or PCT Foreign Prior;Active - Pending

Altering Plant Biomass by Misregulation of Sphingolipid Homeostasis
10/7/2013;61/887,635;PRV - Provisional;Expired

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	59	425	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Percentage of Agricultural Research Division HATCH projects in food production/security and landscapes.

Year	Actual
2014	86

Output #2

Output Measure

- Number of workshops, continuing education programs, web-based curricula and field days/tours related to food production/security and landscapes.

Year	Actual
2014	850

Output #3

Output Measure

- Number of new extension publications and other education resources related to food production/security and landscapes.

Year	Actual
2014	59

Output #4

Output Measure

- Number of new products and decision tools developed and made available to clientele related to food production/security and landscapes.

Year	Actual
2014	24

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Nebraska farmers and ranchers will increase productivity and profitability through adoption of research and extension information provided by IANR programs (measured by value placed on the information by clientele)
2	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).
3	Nebraska farmers and ranchers will increase their knowledge and awareness of how integrated pest management and pesticide best management practices can help protect water quality and human health while providing acceptable crop pest protection (measured by the number of farmers and commercial applicators certified in pesticide safety).
4	Nebraska ranchers will increase sustainability of range resources through adoption of research and extension information provided by IANR programs (measured by value placed on the information by clientele).
5	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 Resource Districts that require the use of water measurement devices.
6	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 indicates that they have adopted or plan to adopt new practices.

Outcome #1

1. Outcome Measures

Nebraska farmers and ranchers will increase productivity and 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	Actual
2014	124000000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Nebraska had 49,600 farms and ranches during 2013. During the 5-year period between 2007 and 2012, Nebraska experienced a 5% increase in the number of farms and a 10% increase in the number of new farmers. Net income per farm averaged $112,966 during the 2009-2013 period. Cash receipts from farm marketing contributed over $23 billion to Nebraska's economy in 2013. Exports are a significant component of that value. Nebraska's $6.6 billion in agricultural exports in 2013 translate into $8.1 billion in additional economic activity. Nebraska's top five agricultural exports in 2013 were soybeans, beef and veal, feeds and fodder, corn, and other plant products.

Nebraska natural resources continue to be essential to the productivity and profitability of Nebraska agriculture. From east to west, Nebraska experiences a 4,584-foot elevation difference and the average annual precipitation decreases by 1 inch every 25 miles, allowing Nebraska to have a diverse agricultural industry from east to west. Nebraska's farms and ranches utilize 45.3 million acres - 92% of the state's total land area. There are nearly 23 million acres (9,307,806 ha) of rangeland and pastureland in Nebraska -- half of which are in the Sandhills. Of the total cropland harvested during 2012, 44 percent was irrigated. Nebraska is fortunate to have aquifers below it. If poured over the surface of the state, the water in those aquifers would be 37.9 feet deep. The state has 96,131 registered, active irrigation wells supplying water to over 8.3 million acres of harvested cropland and pasture. Nearly 24,000 miles of rivers and streams add to Nebraska's natural resources.

What has been done
The work relative to Outcome 1 will focus primarily on cropping systems profitability and productivity. Additional information relative to crop systems sustainability is detailed in Outcome 2,

crop protection in Outcome 3, and water management in Outcome 5. Beef system profitability and sustainability will be the focus of Outcome 4. Examples of extension's programs follow.

Four program areas served as the foundation for agricultural economics management education in 2014. Estate Planning and Business Transition programs address understanding of estate planning and use of estate vehicles to transfer wealth and contribute toward the transfer of farmland to the next generation of farmers and ranchers. Marketing In a New Era (MINE) helps farmers acquire skills and knowledge related to marketing corn and soybeans through real-time simulation (farm marketing game) that provides real market characteristics. A Land Management Program presented at 29 locations across the state focused on land rental arrangements. Finally, Farm Bill Education programs were conducted in cooperation with USDA FSA staff at 84 Nebraska locations.

UNL Extension's Cropping Systems focus on 1) improving yield, competitiveness, and profitability, 2) crop protection and fertility best practice adoption, 3) farm business and risk management, and 4) efficiency of input utilization. Examples of program delivery models implemented include: Nebraska On-Farm Research engaged 51 growers representing 83 replicated on-farm research studies, statistical and cost evaluation of all results, and presentation by participating farmers of their results to their peers (http://cropwatch.unl.edu/web/farmresearch). Crop Science Youth education engaged high school youth in crop-focused education and career opportunities. The team has developed 16 curriculum guides for vocational agricultural teachers (see http://cropwatch.unl.edu/cropwatch-youth/soil_lessons), hosted an Excellence in Ag Sciences Days professional development for 68 ag teachers, and distributed educational materials and 1,625 packets to youth in 69 counties across Nebraska to teach crop protection and irrigation skills. Crop Management Diagnostic Clinics were hosted for 324 consultants and agribusinesses involved in fertility and crop protection sales and services. The No-Till Conference and Cover Crop Field Day reached 219 participants. The southeast Nebraska Crop Clinics hosted 616 farmers and advisors on current crop production issues. Three small scale and sustainable agriculture educational experiences reached 134 participants and four Managing Cropping Challenges workshops brought agronomic information to 65 northeast Nebraska participants.

Results

Our cropping systems-focused educational programs addressing production and economic management topics were delivered through 525 workshops, webinars, and field days reaching an estimated 13,500 participants with 81,000 learner hours of education in 2014. UNL Extension's CropWatch website is an additional important source of information for clientele and reaches 231,000 visitors who viewed 664,000 Web pages in 2014. Our Extension Publications website delivers educational products to all extension program areas, including water, climate, and environment topics. It reached a total of 726,000 visitors and 1,040,000 page views (html formats only, does not count pdf downloads). Examples of results addressing crop production topics follows.

Land Management Programs reached over 1032 participants. In a six-month follow-up evaluation 79% reported having used the knowledge gained to make cash leases more efficient and 62.4% reported using or planning to use flexible cash lease provisions. The $42/acre average impact resulted on average of 387 acres per respondent for a total economic value of $16.7 million.

Farm Bill education reached an estimated 16,500 participants. Initial surveys demonstrate that 89% will use the information provided to make a Farm Bill election, and respondents reported an average 2.3 (scale of 0 to 6) improvement in their use of USDA farm bill program and risk management assessment of the operation.

Crop Marketing In A New Era Programming reached 189 participants. Workshop surveys demonstrated that 89% of respondents are improving their skill with marketing tools and their use, and 94% of respondents reporting intent to use pre-harvest marketing tools to improve profits in 2014/15. Average impact of $28/acre; total of $2.6 million value across all respondents.

Soybean Management Field Days reached 536 participants, representing 3,166,621 total crop acres and placed a value of $7.66 per acre on the knowledge gained and/or anticipated change in practices, for a total combined value of $24.7 million for the program.

Participants in Crop Management Diagnostic Clinics represented 7.9 million acres and reported an estimated value of the program at $77 million. The No-Till Conference and Cover Crop Field Day participants reported an average savings per acre as a result of changed practices of $610,000. The southeast Nebraska Crop Clinics had anticipated changes in practice valued at $1,800,000. The Western Nebraska Sustainable Ag Crops and Livestock Conference participants estimated a value of this educational experience to be $190,000. The Managing Cropping Challenges workshops brought agronomic information to 65 northeast Nebraska participants who estimated the value to be $430,000.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
132	Weather and Climate
133	Pollution Prevention and Mitigation
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	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
307	Animal Management Systems
311	Animal Diseases
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics

Outcome #2

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	Actual
2014	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Sustainable agricultural systems is defined in multiple ways from a perspective of economic, environmental, and social sustainability. This section will focus on environmental sustainable measures and associated research and educational initiatives within this section. Some of the more critical environmental sustainability issues within Nebraska include:

1) Water quantity and quality: These issues are discussed in Outcomes 5 and 6.

2) Resiliency to climate variability/change: Most agricultural producers doubt the credibility of the science around climate change and the potential for human activities contributing to changes. The Sustainable Corn AFRI-funded project's survey of 5,000 corn producers, including many from Nebraska, suggests that between 3 and 9% of Nebraska corn growers agree with the statement that climate change is caused mostly by human activities. However, between 46 and 70% of the same individuals agree that they should take additional steps to protect the land from increased weather variability. While an educational program for Nebraskans on climate issues involves significant challenges because of the skepticism of climate change, it is our belief that agricultural producers are open to conversation on improving resiliency to climate extremes. Missouri River flooding in 2011, flash drought in 2012, and wide-ranging and devastating hail storms in 2014 have created broad awareness of climate variability.

3) Sustainability metrics: Sustainable agriculture has historically been identified by a set of practices and technologies not generally acceptable to conventional agricultural producers. Defining "sustainability" by practices such as organic production or non-GMO seed technologies is not accepted by most agricultural producers. Food supply chain industries have increasingly looked to metrics that are technology neutral and focus on efficiency of input utilization (water,

energy, nitrogen) and environmental losses (soil loss) per unit of agricultural product. One such metric developed by the Food to Market consortium is gaining acceptance among many food supply chain businesses, environmental organizations, and commodity associations.

4) Stewardship of crop protection technologies: Weed resistance to several herbicide controls chemistries has become a substantial challenge for many crop producers. Rootworm resistance to Bt traits in seeds is increasingly being encountered in Nebraska. The potential loss of important crop protection technologies is causing significant concern among the research and agricultural communities. Additional discussion of our response to these issues is presented in Outcome 4.

What has been done

Extension's Resiliency to Climate Change in Nebraska Initiative: An Extension work group consisting of 20 faculty guides Extension educational program planning, targeting improved resiliency of agricultural businesses and communities affected climate variability. Key investments to date include: 1) Reviewed of Nebraska Climate report (http://snr.unl.edu/download/research/projects/climateimpacts/2014ClimateChange.pdf); 2) Formed Beef, Cropping, and Communities sector teams; 3) planning for a 2015 Climate Resiliency professional development for Extension faculty; 4) Guiding extension interactions with USDA ARS High Plains Climate Hub.

Beef Systems: Animal Agriculture in a Changing Climate is an Nebraska-led eXtension initiative resulting in the development and delivery of a national online course (http://animalagclimatechange.org/free-online-course/). In addition, two eXtension communities of practice, Livestock and Poultry Environmental Learning Center and Animal Agriculture in a Changing Climate, cohosted the second Livestock Waste to Worth National Conference which was held in March 2015 in Seattle. The conference had five tracks with climate issues and animal agriculture fully integrated. A third initiative addresses Managing Drought Risk on the Ranch through an educational curriculum (http://drought.unl.edu/ranchplan/Overview.aspx) in partnership with the National Drought Mitigation Center.

Crops Systems: Useful to Useable (U2U) is an AFRI-funded, integrated project involving land grant university faculty from Nebraska, Iowa, Indiana, and Michigan. The project transforms existing climate data into usable products such as a suite of five Ag Climate-related decision tools (https://mygeohub.org/groups/u2u/tools). The Corn Growing Degree Days tool is a modeling tool that was used extensively in 2014 to help corn producers make replanting decisions following a series of devastating hail storm events. A second initiative, Project Sense, launched by the Nebraska On-Farm Research Network, will implement 20 on-farm research evaluations of crop canopy sensors to determine variable-rate, in-season nitrogen application in corn. Additional field research is initiated through a three-year cover crop project at four locations under unique climatic conditions to develop a Nebraska-specific research base for cover crops. Finally, Nebraska extension is engaging with Field to Market which is focused on establishing a multi-metric measurement of sustainability in commodity crop production.

Community Resiliency efforts are described in Outcome 6.

Results

Our cropping systems-focused educational programs addressing water, climate, and environmental topics were delivered through 158 workshops, webinars, and field days, reaching an estimated 5,300 participants with 22,000 learner hours of education in 2014. This includes those programs targeting water quantity and quality issues (discussed in Outcomes 5 and 6). UNL Extension's Water website is an additional important source of information for clientele and reaches 77,000 visitors who viewed 165,000 Web pages in 2014. Our extension publications

website delivers educational products to all extension program areas, including water, climate, and environment topics. It reached a total of 726,000 visitors and 1,040,000 page views (html formats only, does not count pdf downloads). Examples of results addressing Climate and Sustainability topics follow:

Animal Ag in a Changing Climate project: An eight-module online course was regionally pilot tested in 2014 with a final product now available.

Climate Resiliency in Crop Production: Faculty piloted the first Climate Resilient Agriculture conference which was attended by 60 farmers and industry representatives. It focused on climate resources and decision tools. The pilot provided a learning experience for faculty on starting a successful conversation on climate issues.

The Nebraska Ag Climate Update: The monthly newsletter was launched in 2014 and distributed through the CropWatch website, 3,116 CropWatch newsletter subscribers, and twitter (see http://go.unl.edu/ttk0 for example).

The Nebraska Extension on-farm research network: The network was utilized to complete five on-farm cover crop research trials and implement crop hail injury studies in six counties to understand crop response to hail events and to evaluate current recommendations for replanting decisions.

Sustainability Metrics: Field to Market fieldprint for estimating sustainability metrics was pilot tested on 26 Nebraska farms. In addition, faculty are collaborating with 21 of the 23 NRDs in analyzing their producer-reported databases to create Nebraska-specific metrics for water and nitrogen use efficiency.

Yield Forecasting: A pilot initiative for delivering in-season corn yield forecasts for 25 locations across the US Corn Belt was launched. These forecasts utilized the U2U Corn Growing Degree Days model estimate mean and range of yields likely based upon historic, site-specific climatic data and shared through CropWatch and other farm media. Crop Watch articles presenting the yield forecasts received 12,000+ views (up to Oct 2014).

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
132	Weather and Climate
133	Pollution Prevention and Mitigation
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	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants
301	Reproductive Performance of Animals

302	Nutrient Utilization in Animals
307	Animal Management Systems
311	Animal Diseases
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

Nebraska farmers and ranchers will increase their knowledge and awareness of how integrated pest management and pesticide best management practices can help protect water quality and human health while providing acceptable crop pest protection (measured by the number of farmers and commercial applicators certified in pesticide safety).

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	13576

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Critical issues associated with Integrated Pest Management include:
1) Applicator safety. Increasing use of a broader range of chemistries is again exposing applicators and their families to potentially greater risks associated with exposure. As biotechnology seed technologies begin to lose effectiveness, greater use of insecticides and seed treatments are occurring. Rotation of herbicide chemistries to address the issue of weed resistance to heavily used pesticides is also adding to a broader range of chemistry exposure.
2) Drift and implications on neighboring crops. Growing production of grapes and other horticultural crops in Nebraska to meet the needs of local food markets has added greater attention to pesticide drift from pesticide application on commodity crops such as corn and soybeans.
3) Resistance of weeds to commonly used herbicides and insects to Bt seed traits has resulted in the need to change pest control practices to reduce the risk of developing resistance or in managing systems where resistant weeds and insects have become established.
4) Implications for water quality result as we begin replacing lower-risk pesticides such as glyphosate with pesticides that persist for longer periods in the environment. Atrazine continues to exceed regulatory standards in several Nebraska watersheds. The Nebraska Department of

Agriculture has proposed a new policy and process for responding to water quality problems resulting from pesticides. This proposal is expected to become official in 2015.

What has been done
Weed resistance to herbicides was the focus of two extensive field research sites on commercial farms, four winter workshops, and two field days that demonstrated practices and technologies for minimizing resistance.

The Commercial/Noncommercial Pesticide Safety Education Program (PSEP) continues as our flagship program for addressing pest management issues, applicator safety, water quality, and drift issues. Nine regional Crop Production Clinics licensed over 9,558 people as commercial and noncommercial pesticide applicators in Nebraska with approximately 3,448 commercial/noncommercial pesticide applicators trained in 2014. The 2014 Private PSEP local educational workshops trained more than 10,128 participants with a total of 20,807 private applicators certified in Nebraska.

In 2014, the Pesticide Safety Education program developed three new publications and nine new videos to support trainers. In addition to traditional commercial, noncommercial, and private applicator education programs, the team delivered hands-on termite schools for pest management professionals, urban pest management conference workshops, custom applicator school, and IPM in-school trainings and coalition building.

In addition to the above PSEP educational events, extension delivery approaches for 2014 programs included a PSEP Educator Forum (train the trainer workshop), five crop diagnostic in-field clinics targeting crop advisors, four soybean management field days, four weed resistance field days at sites with significant glyphosate resistance weed challenges, multiple IPM school-targeted clinics, pesticide container recycling program, and CropWatch e-newsletter and website. Some individual faculty activities/accomplishments in 2014 included 1) developed and initiated applied research on pest management technologies using a nationally unique wind tunnel testing laboratory for both ground and aerial applied pesticides; 2) partnered with Dow AgroSciences to develop the data needed to get the Enlist Duo label approved; 3) organized a regional webinar corn rootworm management in the transgenic era with 330 sites registered; 4) appointment to the Hard Winter Wheat Coordinated Project (HWW-CP) Committee by the Steering Committee of the U.S. Wheat & Barley Scab Initiative.

Results
Private pesticide safety education has frequently or very frequently produced reductions in pesticide use (29% of participants); regular monitoring to correctly identify pest problems (74%); safe pesticide storage, handling and application practices (93%); application of BMP to reduce contamination (92%); and use of IPM control strategies (76%). A recent emphasis has been placed on identification of sensitive crops through the Driftwatch website. Seventy percent of participants are taking extra steps to avoid drift when aware of sensitive crops.

Behavioral changes (I will "frequently" or "very frequently" apply) resulting from the Commercial/Noncommercial Pesticide Safety Education Program included the following:
88% will use drift reduction nozzles and related practices;
95% will use PPE for protecting personal health;
95% will take steps to prevent carrying pesticide residue into the home;
66% will use Driftwatch prior to spraying pesticides.

The Crop Management & Diagnostic Clinic provides an opportunity for technology transfer to primarily industry with a significant focus on crop protection issues. In 2014 the clinic impacted:

- 324 industry agronomist, consultants, and/or growers who attended five training sessions
- Participants represented 7.9 M acres, representing 48 counties and six states, economic impact
- $77 M
- 88% said the training was above average or one of the best to attend.

Soybean Management Field Days, which focus heavily on crop protection issues produced the following results:
- $156,000 in grant funds secured from the Nebraska Soybean Board; assembled a team of 14 faculty and graduate students to develop and implement soybean research at four farm sites in Nebraska.
- 536 growers/advisors attending the field days influence 7.9 million acres and 35% of those participating indicated the knowledge and skills gained would result in a behavioral change as it relates to 15 production, marketing, or risk management topics.
- 536 growers/advisors estimated the value gained at over $25 million.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
133	Pollution Prevention and Mitigation
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants
311	Animal Diseases
601	Economics of Agricultural Production and Farm Management

Outcome #4

1. Outcome Measures

Nebraska ranchers will increase sustainability of range resources 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	Actual

2014 32000000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nebraska, 20,000 beef cow operations and 4,500 cattle feeding operations care for 7 million cattle annually. Twenty-four million acres of range and pasture resources are a primary source of feed for 1.8 million head of beef cows in Nebraska. Half of this rangeland is in the Nebraska Sandhills, a unique ecosystem that has transitioned from rich grasslands to dessert sand dunes multiple times during its history as a result of climate shifts. Future potential for climate change or increased climate variability will place this fragile ecosystem at risk. Drought conditions dramatically reduced forage production and grazing opportunities in 2012 and weakened the regrowth in 2013. Closer to normal precipitation patterns were experienced in 2014.

Drought conditions in the southern and central plains states over the last three years have produced declines in cow herd size and resulting calf crops. Nebraska's cow herd continued its decline with a loss of an additional 21,000 head in 2014 while the U.S. cow herd increased by 2% over the same period. Nebraska's calf crop was down by 70,000 head in 2014. However, the number of cattle on feed increased by 100,000 head in 2014 in Nebraska. Lower beef production levels began showing up in the market with record market cattle prices that persisted through 2014. In addition, lower prices for feed grains, and ethanol and distillers co-products have resulted in profitability in cattle production late in 2014. Adapting to drought conditions, identifying alternative forage supplies, and considering alternative production systems for the cow herd are becoming increasingly important to the sustainability of Nebraska's 20,000 businesses (beef cow operations) and to the rural infrastructure of Nebraska.

What has been done

Program examples include:
1) Ranching for Profitability, Cattlemen's Days, State of Beef Conference, Feedlot Roundtable and Schools are half to one day educational programs updating producers on industry trends and research-based information.
2) Ranch Practicums that deliver in-depth, hands-on learning experiences.
3) Husker Beef Nutrition Conference and other "train the trainer" events target beef industry consultants.
4) Field days and producer partnerships providing translational education via experiences and demonstrations.
5) Husker Mobile Beef Labs educating 3,600 youth and adults in 2014 with hands-on learning experiences.
6) Nebraska Youth Beef Leadership Symposium increased knowledge of 82 youth in an on-campus experience.
7) Gudmundsen Sandhills Lab Youth Field Day reached high school age youth from the Sandhills region who learned about beef production and the Sandhills ecosystem through labs and field educational experiences.

In 2014, Nebraska's Extension Beef Systems Spire programs focused on:
1) Improving competitiveness, sustainability, and profitability of beef producers.
2) Adoption of Quality Assurance practices that facilitate responsible production of wholesome beef.
3) Improving natural resource stewardship and nutrient management to protect Nebraska's water and soil.
4) Partnerships with industry organizations that benefit Nebraska beef producers and Nebraskans

as a whole.
5) Increasing youth and adult understanding of Nebraska's beef production systems, quality of products, and science concepts in beef systems.

Extension specialists and educators also delivered online information and learning experiences:
1) There were 200,000 Beef.unl.edu visitors and 27,000 webinar views along with social media information delivery.
2) There were 740 subscribers to the monthly BeefWatch Newsletter with 125,000 page views.
3) Beef.unl.edu and BeefWatch content was broadly used by public media, multiplying client reach and impact.

Results
Our beef systems-focused educational programs were delivered through 179 workshops, webinars, and field days reaching an estimated 8,900 participants with 36,000 learner hours of education in 2014. UNL Extension's Beef website is an additional important source of information for clientele and reached 213,000 visitors who viewed 432,000 Web pages in 2014. Our extension publications website delivers educational products to all Extension program areas, including water, climate, and environment topics. It reached a total of 726,000 visitors and 1,040,000 page views (html formats only, does not count pdf downloads). Examples of results addressing beef topics follows.

A survey of participants in Nebraska Beef Extension educational experiences was conducted at the end of 2014. The survey of 340 Nebraska beef producers using extension resources suggested:
- 9 of 10 stated knowledge gained from extension improved profitability of their operations.
- $28 per head increase in profitability from knowledge gained, worth $8.4 million to these producers.
- If these producers are representative of the 1,307 participants in the sampled educational programs discussed below, then our impact from these sample programs represents approximately $32 million. If applied to all 8,900 participants in beef educational programs, the total value would be significantly larger.

The Ranching for Profitability and Beef Profitability Workshop series reached 295 people representing 500,000 cattle and 1,080,000 acres with a program focused on management strategies for recover after the drought and improved profitability. One out of two planned to make management changes as a result of knowledge gained.

The State of Beef Conference focused on cow herd rebuilding; 180 people attended, representing 1.5 million cattle and 1.4 million acres. Nine out of 10 respondents indicated moderate to significant knowledge gain.

The West Central Cattlemen's Day focused on cattle nutrition, forage management, and cow herd rebuilding; 180 people attended, representing 108,000 cattle and 346,000 acres. Two out of five planned to make management changes as a result of knowledge gained.

Five Essentials of Ranch Management targeted foundational elements of ranch profitability; 416 people attended, representing 150,000 cows and 900,000 acres. Seven out of 10 planned to modify practices as a result of knowledge gained.

The High Plains Ranch Practicum, a 10-day hands-on experiential learning program, focused on improving ranch management skills. Nineteen people representing over 1,600 beef cows and 50,000 acres of land estimated resulting changes to be worth over $100,000.

The 2014 Feedlot Roundtable focused on cattle health, regulations, BQA, nutrition, and current research; 192 people representing 2,000,000 cattle and 500,000 acres estimated $12 per head in improved profitability, a $24 million dollar value.

The 2014 Husker Nutrition Conference focused on the use of corn silage, by-products, residue use, and cover crops; 25 people, representing 1.4 million cattle and 90,000 acres, participated.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
213	Weeds Affecting Plants
302	Nutrient Utilization in Animals
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics

Outcome #5

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 Resource 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	Actual
2014	91

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Nebraska is one of the most groundwater-rich places in the United States. Approximately 88% of the state's residents rely on groundwater as their source of drinking water. If the public water supply for the Omaha metropolitan area (which gets about a third of its water supply from the

Missouri River) isn't counted, this rises to nearly 99%.

According to the USDA 20212 Farm and Ranch Irrigation Survey, Nebraska irrigates approximately 8.23 million acres with more than 8.07 million acre-feet of water annually. This represents a slight decline in acres irrigated and a 15% increase of water. Considering that 2012 was a record drought year, an increase of 15% might be less than expected. The ability of farmers and ranchers to irrigate Nebraska crops contributed $11 billion to Nebraska's economy in 2012. Irrigation was key in protecting 31,200 jobs in Nebraska in 2012.

High Plains aquifer levels continue to show some declines in Nebraska. Between 2004 and 2014 three southwestern counties and one Panhandle county have experienced a 1-to-15-foot drop in the aquifer level; 10 south central counties have experienced a 1-to-10-foot drop; and four northeast counties are experienced a 1-to-5-foot drop. Most of the remaining state is experiencing static or increasing groundwater levels. In 2004, state policy established a process for defining watersheds as a fully or over-appropriated. Part or all of 11 natural resource districts are currently defined as fully or over-appropriated. Over-appropriated basins are required to reduce water use to 1997 levels.

What has been done

The Nebraska Ag Water Management Network is an extension-led system for testing cutting-edge technologies and creating a network with growers, UNL Extension, NRDs, NRCS, crop consultants, and other interested partners that will enable the adoption of water and energy conservation practices. NAWMN project grew to 1,200 participants statewide covering 1.7 million acres. It received the USDA NIFA Innovative Programs and Partners Award for its groundbreaking water management work.

The NAWMN team released three new apps for smart phones and tablets in 2014. To date, there have been over 1,800 downloads for the four water-related apps the team has developed.

In 2014, Nebraska Extension programming in the area of irrigation water management reached over 4,500 producers and consultants, and over 1,550 youth. Sample programs include the Water Resource Education initiative, which provided tools and training on irrigation and water quality to 68 agricultural education teachers. Eighty-two percent of participants planned to use, expand, or had already used the equipment in their curriculum. Ag water use was a key part of the 2014 Soybean Management Field Days: 46% of attendees were likely or very likely to improve their water use efficiency after learning about replicated research plots at four locations across the state.

The West Central Water Resources Field Laboratory near Brule, Nebraska, is a recent addition to the network of research. The laboratory provides 1,280 acres of land for which corn stalk grazing impacts on water use efficiency, nitrate, and water stress in-field measurement methods, and drought tolerant corn varieties are evaluated among numerous other research and educational initiatives.

Results

Nebraska Extension programming in the area of irrigation water management reached over 4,500 producers and consultants and over 1,550 youth. Since 2005, the Nebraska Ag Water Management Network is estimated to have reduced pumping by 1 million acre-feet of water, helping to preserve Nebraska's ground and surface water for future generations. Nebraska's use of irrigation improves the state economy, with estimates that every inch of water applied per acre generates roughly $100 of economic benefit to the state.

Water use on 3.3 million acres of cropland from 10 reporting Nebraska NRDs returned to levels approximately equal to pumping levels in 2009-11 representing about a 50% reduction from the 2012 drought year, and a 10% reduction since 2005-05. Water use had steadily declined from 2006 to 2011, increased to 208% of the 2005 level during the drought of 2012, and returned to a similar level as pumped in 2005 during 2013.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
132	Weather and Climate
133	Pollution Prevention and Mitigation
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
605	Natural Resource and Environmental Economics

Outcome #6

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 indicates 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	Actual
2014	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Water quality is an issue of importance to Nebraska. Nebraska divides surface water into 26 water basins and monitors three properties (conductivity, atrazine, and ammonia) for which trends are quantified since 2001. Conductivity is not changing in 11 basins and increasing in 15 basins. Atrazine is not changing in 24 basins and declining in two basins. Ammonia is not changing in 20 basins, declining in four basins, and increasing in one basin.

The Statewide Groundwater Monitoring Network suggests that there is no clear trend (up or down) in the nitrate concentrations in groundwater for the data gathered from 2000 to the present. Prior to 2000, nitrate concentrations had been increasing. At this time there is not enough recent data statewide for atrazine, alachlor, metolachlor, or simazine to conduct any trend analyses.

What has been done

Urban Water Use and Literacy: The WATER Machine Team delivered water resources education to more than 1,250 learners across the state of Nebraska. Topics included occurrence of groundwater, groundwater/surface water interaction, different types of aquifers, water wells, pollutant sources and general groundwater quality. There were 44 sessions, each 45-minutes long, delivered at 13 events.

Onsite Wastewater Curriculum: A new onsite wastewater curriculum was developed and delivered. Topics include topographic considerations for layout, setback distances, mound location and design, and dosing system sizing and design. Completion of this training provided a deeper understanding of mound systems, thereby leading to improved success in completion of the endorsement exam and leading to knowledgeable professionals who can install mound systems in environmentally sensitive areas. A total of 112 onsite wastewater professionals attended the training sessions.

Drinking Water: Extension helped move forward new Nebraska Title 178 NAC 12 regulations regarding well construction to prevent source water contamination. People used drinking water and wastewater information offered through websites and social media to achieve desired water quality; 46,641 viewed water/waste blogs posted to http://acreage.unl.edu website.

Stormwater Programs: Stormwater management programs were delivered to 1,359 participants, 1,800 youth from 40 counties. Three new NebGuides, one new Extension Circular, five online learning videos, and five stormwater minute videos were developed and posted to http://water.unl.edu and have been viewed 833 times. Stormwater Sleuth and Running Rain kits were piloted with 15 educators. Extension received a $3,000 public education and information grant from the Nebraska Academy of Sciences to put 120 kits in elementary and middle schools in EPA Phase II towns in Nebraska by January 2015. The pdf publication has been downloaded over 30,000 times in the 2014 calendar year. Extension's Stormwater Management educational programming provided licensed professionals with opportunities to earn 46 hours of continuing education credits in 2012 and 2013. Programming also led to specification of numerous stormwater management practices in public and private projects and the sharing of information about runoff, runoff pollution, and stormwater with other design professionals, clients, and the public; 107 engineers, architects, municipal employees, green industry/design professionals, Master Gardeners and others increased their awareness and knowledge of green infrastructure methods for urban stormwater management and water resources protection by attending Green Infrastructure Best Management Practice Tours.

Extension Master Gardener: In 2014, 474 Master Gardener volunteers reached 96,210 people, through 25,228 volunteer hours, with a public value of approximately $487,951.00 or the equivalent of 12 full-time extension educators. An emphasis was placed on training Master Gardeners to reduce water use in management of lawn and garden areas.

Results

Our water, climate, and environment program targeting homeowners and urban spaces was delivered through 160 workshops, webinars, and field days, reaching an estimated 7,500 participants with 44,000 learner hours of education in 2014. UNL Extension's Backyard Farmer and acreage websites are an additional important source of information for clientele, reaching

296,000 visitors who viewed 456,000 Web pages in 2014. Our extension publications website delivers educational products to all extension program areas, including water, climate, and environment topics. It reached a total of 726,000 visitors and 1,040,000 page views (html formats only, does not count pdf downloads). Examples of results addressing homeowner and urban water, climate, and environment topics follows.

Onsite wastewater curriculum: Survey data shows that the 2014 participants either worked on or installed about 2,500 onsite wastewater systems per year, and treated about 304 million gallons of wastewater, before the water was recycled to the environment. This education resulted in wastewater treated to a higher standard. 92% responded that they intend to follow the procedures spelled out in the regulations to protect water quality, watersheds, and water wells.

Stormwater management: Community leadership groups received leadership and guidance for $440,000 of lake rehabilitation projects, resulting in more than 10,000 cubic yards of sediment removal, 1,100 feet of shoreline stabilization, interception of five acres of stormwater for treatment, development of a healthy warm water fishery, installation of three rain gardens, and reduction of soil erosion on five acres.

John Royster, ASLA, PLA, LEED AP BD+C and president and CEO of Big Muddy Workshop, an Omaha landscape architecture design firm, stated, "UNL Extension has provided such high-quality and relevant stormwater education events over the past few years that it is an easy decision to make regarding sending our staff to programs that the UNL Stormwater Group presents or co-sponsors."

Urban water use: In 2014, horticulture educators, with assistance from staff in the Department of Survey, Statistics and Psychometrics, developed and implemented a survey questionnaire for extension Master Gardeners to measure the impact of Nebraska Extension programming on clientele lawn and landscape water usage. Key findings include: 1) Master Gardeners applied, on average, a decreased in water use of 22% or 195 gallons per week; and 2) Master Gardeners also used key indicators to determine when irrigation was needed including 91% watched landscape plants for signs of wilting; 65% probed the soil in landscape beds; and 52% used lawn color to determine when to irrigate.

In addition, 15,026 Nebraskans and 3,625 green industry professionals, through 377 UNL Extension programs, have increased their use of environmentally and economically sustainable greenspace practices. Horticulture educators implemented a survey questionnaire for green industry professionals to measure the impact of their water usage and recommendations to clientele. Green industry professionals that attended Nebraska Extension winter programming managed irrigation for over 895 residential properties (12,826 acres), and 845 commercial properties (4,920 acres). Significant changes included inspection of irrigation systems, restricted water use during dry periods, and better management of systems during wet periods with shutting systems down.

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
132	Weather and Climate

133	Pollution Prevention and Mitigation
205	Plant Management Systems
605	Natural Resource and Environmental Economics

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: The extreme drought conditions of 2012 largely disappeared in 2014. However, extreme weather events in the form of intense and widespread hail storms and straight line winds created wide spread crop destruction in several regions in Nebraska on a scale not commonly observed.

Economy: 2014 commodity crop prices were substantially below 2012's record-setting prices and commonly below the costs of production. At the same time, record prices for finished cattle and calves/yearlings for filling feedlots created substantial incentive for again growing the beef herd in Nebraska. The conversion of grassland and forage cropland to corn and soybeans over the past several years has resulted in forage resources being in short supply for maintaining or growing Nebraska beef herds. These economic drivers are providing strong incentives for returning some cropland to forages, utilizing alternative forages such as cornstalks in feeding programs, and feeding of cow herds in confinement systems. In addition, the PED virus persists in Nebraska swine herds but with some signs of fewer death losses and softening prices for pork. Preliminary findings from the 2015 University of Nebraska-Lincoln Nebraska Farm Real Estate Market Survey indicate that as of February 1, 2015, the weighted average farmland value declined by about 3 percent over the prior 12-month period to $3,210 per acre. Since February 1, 2014, the largest price decline at about 10 percent by land class in Nebraska reported by survey participants occurred in the dryland cropland category.

Ethanol production: There are currently 24 active ethanol production plants in Nebraska, with a combined production capacity of over 2.1 billion gallons of ethanol each year, and requiring more than 700 million bushels of grain in the process. Despite slimmer margins and pressure from falling gas prices, ethanol plants churned out the corn-based fuel at record-breaking rates in December 2014. The U.S. Energy Information Administration reported three consecutive weeks of record-breaking production in December as the industry ramped up to a record 992,000 barrels per day in late December. Every plant in Nebraska is operating at or above capacity. The Iowa State University Center for Agricultural and Rural Development reported the industry had profit margins of $2.04 a gallon in April 2014, an all-time high, which had dwindled to 58 cents a gallon by Dec. 19. Strong export demands, the lowest corn prices in four years and a healthy market for distillers grains combined to make 2014 a good year for ethanol.

Public policy and government regulations: The completion of the five-year farm bill and its implementation led to the need for significant educational efforts to help farmers and ranchers understand their options and sign up for appropriate programs. Extension and FSA partnered to implement a substantial educational effort responding to this need that began during the fall of 2014 and persisted through the winter. Waters of the U.S. proposal by USEPA has proved to be a highly contentious issue in 2014, resulting in an unprecedented level of backlash among agricultural groups and creating significant questions about the future of these proposals.

Appropriation changes: Steady state tax collection (and support for university funding) and static federal budget support in 2014, and increasing student enrollment growth (and tuition income) has led to Extension faculty positions and support remaining constant in 2014.

Competing public priorities: A food consumer who has little connection and no understanding of modern agricultural production systems with a desire to increase her or his influence over environmental and social sustainability of food production continues to challenge farmers and the food industry. The food supply chain continues to ask questions about the sustainability of the raw food products that it is purchasing. Agreement is beginning to emerge for commodity crops such as corn, soybeans, and wheat as to procedures that will be used for assessing sustainability. Field to Market, a collaboration of commodity group leadership, food industry representatives, and NGOs, is becoming an accepted approach for defining and documenting sustainability of commodity crop production. While the metrics and procedures developed by Field to Market are gaining acceptance, significant challenges lie ahead for convincing farmers of the need to share their individual field level metrics through programs such as Field to Market. Defining sustainability in the beef industry lags behind the commodity crops initiatives. Recently, international guidance for beef industry sustainability has been proposed. It is now up to a similar collaboration of industry, food supply chain, and NGOs in the beef industry to come up with procedures for defining sustainability metrics in the U.S.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Nebraska Extension has developed an impact report for each of its Action Teams. These can be found on our Extension impact page at: http://www.extension.unl.edu/makingadifference.

The Nebraska Agricultural Experiment Station measures its success in its ability to provide Extension with cutting-edge research results that impact Nebraska. In addition, we have begun to use a commercial product (Academic Analytics) to assess faculty productivity measures.

Key Items of Evaluation

Nebraska Extension continues to identify signature outcomes and indicators in each of its programming areas and is collecting statewide data to assess progress made toward achieving those outcomes. In 2014, each extension Action Team completed an outcome report highlighting its efforts and the impact of those efforts on clientele. These reports have been instrumental in working with stakeholders who in turn used them to advocate on behalf of the extension program. Additional efforts are underway to enhance the skills of Action Team leaders in order to strengthen selected indicators and evaluation strategies.

Information regarding Academic Analytics can be found at: http://www.academicanalytics.com/ .

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

People and their Wellbeing

☑ Reporting on this Program

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	0%		21%	
204	Plant Product Quality and Utility (Preharvest)	0%		6%	
303	Genetic Improvement of Animals	0%		1%	
308	Improved Animal Products (Before Harvest)	0%		1%	
403	Waste Disposal, Recycling, and Reuse	0%		5%	
501	New and Improved Food Processing Technologies	0%		4%	
502	New and Improved Food Products	0%		9%	
503	Quality Maintenance in Storing and Marketing Food Products	0%		4%	
607	Consumer Economics	0%		2%	
608	Community Resource Planning and Development	15%		1%	
610	Domestic Policy Analysis	0%		5%	
702	Requirements and Function of Nutrients and Other Food Components	0%		13%	
703	Nutrition Education and Behavior	20%		1%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%		1%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%		4%	
724	Healthy Lifestyle	15%		5%	
802	Human Development and Family Well-Being	0%		12%	
806	Youth Development	50%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	51.0	0.0	23.0	0.0
Actual Paid	85.0	0.0	17.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1687157	0	534949	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
2002170	0	437988	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Basic and applied research will focus on: 1) rural and urban family life and lifestyles; 2) human nutrition, with particular emphasis on how foods, our molecular and macro-environments, and food systems interact to impact our well-being; 3) food sciences, including food processing safety, food production waste reduction, and processing technologies to ensure human well-being and nutritious food choices.

Planned program activities include a cascaded approach to creating long-term behavior change. Each of these program areas will include: 1) mass-media educational efforts at reaching the general public (websites, news articles, general contacts); 2) 1-2 hour workshops that focus on increasing knowledge; 3) longer-term (4-6 hour) learning experiences that begin to change attitudes and practices; and 4) in-depth training that involves multiple contact opportunities over an extended period designed to create behavior change. By using this approach, a variety of learners are engaged in programming that best fits their needs.

Examples of program activities include:

- workshops for child care providers to increase their skills in developing social-emotional strengths in young children.
- web-based learning modules designed to give divorced or separated parents the skills to better interact with their families.
- campus-based career camps which enable high school students to interact with faculty while exploring post-secondary options.
- nutrition education workshops to help high-risk families make healthy choices on limited budgets.
- technology-based experiences using apps, social media, etc.) to help engage users in learning around core topics.

• workshops for food service providers and post-harvest producers on cutting-edge resources to enhance food safety and quality.

All of these program activities will be purposefully designed to reach targeted outcomes and achieve long-term impact.

2. Brief description of the target audience

The target audience includes:

- high-risk families
- children and youth
- families of young children (young children defined as those 0-8)
- producers
- food processing and retail establishment owners/workers
- consumers, and
- business/community leaders

3. How was eXtension used?

In 2013 (most recent time for which statistics are available), 112 Nebraska citizens using Ask an Expert asked 135 questions with 84 responses provided by UNL Extension faculty and a total of 417 Ask an Expert questions were answered for out-of-state people by UNL Extension faculty. Nebraska is represented by 281 eXtension members in 55 of the 76 CoPs and 22 who provide leadership for CoPs.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	388314	1755106	140000	28544

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	171	117	288

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of extension in-depth workshops.

Year	Actual
2014	110

Output #2

Output Measure

- Percentage of Agricultural Research Division HATCH projects in nutrition, family health and well-being, food safety, and career development.

Year	Actual
2014	14

Output #3

Output Measure

- Number of scholarly publications and curricula related to nutritional sciences and family well-being.

Year	Actual
2014	18

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase adoption of pre-harvest methods for food quality and safety.
2	Nebraska will have access to higher educated workforce to meet the needs of the 21st century workplace.
3	Youth will increase behaviors that result in healthier lifestyles.

Outcome #1

1. Outcome Measures

Increase adoption of pre-harvest methods for food quality and safety.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4456

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Agriculture is the economic driver in Nebraska's economy accounting for $12 billion annually. Over half, $7.2 billion, of this revenue comes from the beef industry. Improving the profitability of beef producers contributes to the economic vitality of Nebraska cities and towns. There are 6.3 million head of cattle and calves in Nebraska, ranking us second nationally. The cow-calf enterprise is a complex production system that integrates human, financial, and natural resources. As world populations continue to grow, the efficient, sustainable conversion of forage and feed resources into high-quality protein products will be increasingly important. Nebraska farmers and ranchers are positioned to be leaders in the production of economical, safe, and healthy food.

What has been done
Extension assisted processors in implementing food safety controls and new technologies for the reduction of food-borne hazards through the following:

- conducted five "Implementing Your Company's HACCP Plan" workshops with approximately 100 company employees and coordinated programming for three additional workshops. These workshops provided the employees with the tools to implement and manage HACCP in their facility to meet USDA regulations and reduce the risk of food-borne hazards.
- developed a workshop for controlling STEC in small meat (beef) processing operations.
- assisted two small meat processing businesses with establishment of grant of inspection and assisted approximately 30 very small meat processing businesses with HACCP plans, food safety plans, and responses to regulatory noncompliance.
- assisted with arrangements for a field study on antimicrobial interventions for reducing STEC on veal carcasses during the slaughter process.

Extension also improved the understanding of livestock producers and meat processors on quality, consistency, and value of market animals and processed meat products through:
- a Pork 101 course designed to improve the quality, consistency and value of pork.
- a carcass boxed beef cut-out demonstration and beef value demonstration for Nebraska Cattlemen.
- a display on beef carcass grades, cuts and value for the Mobile Meat Laboratory during the Ak-Sar-Ben Livestock Expo.
- carcass contests for the Nebraska State Fair and the Ak-Sar-Ben Livestock Expo.
- a cured meats contest for the Nebraska Association of Meat Processors.
- four projects for clients involving the Food Processing Center and how to introduce a new product or ingredient.
- presentations with instructions for identification of retail meat cuts used in youth contests involving over 500 young people.

Results

Nebraska Extension faculty organized registration for eight workshops and taught and served as the lead instructor for five "Implementing your Company's HACCP Plan" workshops for industry in Nebraska, Kansas, Missouri and South Dakota. Two workshops were for a major beef processor in Liberal, KS. One-on-one assistance was provided to 15 small meat processing businesses for HACCP plan development, reassessment, and implementation of food safety procedures. Two small business companies were assisted with HACCP plans for establishment of federal meat inspection in their facility.

Nebraska Extension developed curriculum and an instructional video and presentation for process controls for E. coli O157 and non-O157 STEC in beef. A workshop curriculum with presentations and demonstrations was developed and pilot tested at a meeting with South Dakota small business meat processors and South Dakota State Meat Inspection personnel. An overview of STEC and this workshop curriculum was presented at the National Association of State Meat and Food Inspectors 2014 Annual Meeting. Extension organized the logistics for a research project for the reduction of STEC on bob veal calves during the slaughter process at Fresno State University. The project evaluated antimicrobial treatments applied to the hide during the slaughter process. An abstract poster session was presented at the 2014 Beef Industry Food Safety meeting.

Workshops provided participants with the tools to implement and manage HACCP in their facility to meet USDA regulations for HACCP and food safety. HACCP workshop participants indicated that they felt more comfortable in utilizing the HACCP principles in their programs and indicated that they would be using them regularly. The overall comfort levels of the participants for working with HACCP plans increased after completion of the course. Individual assistance was provided to small business meat processors with HACCP plans, and SOPs that would meet government regulations. Standard procedures for the control of E. coli will provide small business beef and veal processors with tools to train employees and improve slaughter process controls.

Extension organized and conducted carcass contests for the Nebraska State Fair and the Ak-Sar-Ben Livestock Show involving over 450 exhibitors. It organized and conducted Meat Evaluation and Identification contests for PASE and the Nebraska Career Development Events (CDE) and developed presentations on retail meat cut identification that are new for the youth CDE Meats Contest and the 4-H PASE Meats for the Consumer Contest to be published on the Web. Extension conducted a workshop, including presentations and cutting demonstrations, for vocational agriculture instructors (FFA) on new retail cuts and laboratory practicums for the career development events. Exhibitors received carcass information to better understand the carcass quality characteristics and value difference of their show animal. Contest participants are exposed

to meat evaluation and food safety to increase their knowledge on these subjects and to help them better understand career opportunities in the meat industry.

Extension helped to improve processed meat quality and profitability of small and very small meat processing businesses and organized and conducted the evaluation of processed meat products for the Nebraska Cured Meats Competition. Evaluations were conducted on over 250 processed meat products. Association members will be able to utilize the product ideas and meat processing techniques to improve the variety and quality of products they sell in their business.

Extension established programs for occupational safety, lock-out and tag-out programs, developed a HACCP plan for the production of Landjaeger snack sticks, and reassessed 13 HACCP plans for Loeffel Meat Laboratory.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
204	Plant Product Quality and Utility (Preharvest)
308	Improved Animal Products (Before Harvest)
608	Community Resource Planning and Development
703	Nutrition Education and Behavior
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #2

1. Outcome Measures

Nebraska will have access to higher educated workforce to meet the needs of the 21st century workplace.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	42250

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nebraska 4-H strives to help young people achieve their greatest potential by introducing high-quality youth development experiences into the lives of Nebraska youth and families. Engagement in 4-H results in youth who are making positive decisions related to their health and their future goals. Further, they are advocates and leaders determined to leave a lasting impact on Nebraska communities.

By taking part in Nebraska 4-H, youth are preparing for a successful future by focusing on five key areas: 1) Science, 2) Agricultural Literacy, 3) Career Development and College Readiness, 4) Community Engagement, and 5) Healthy Living.

What has been done

Program efforts in each of the five areas follows:

Nebraska 4-H is developing science interests, skills, and abilities in the areas of agriculture, energy, environmental stewardship, and technology. Signature program efforts included Outdoor Skills in partnership with Nebraska Game and Parks, GEAR-Tech 21 Robotics, Animals Inside and Out, Embryology, Corral your Future, Animal Science Day Camps and Companion Animal programs. These programs, each involving a minimum of 10 contact hours, were delivered to more than 4,500 young people. An additional 3,400 youth were reached through participation in the Nebraska State Fair Largest Classroom.

Nebraska 4-H is helping youth focus on their future success and preparing youth to make informed decisions about their college and career path. Signature program efforts included Connecting the Dots, Big Red Summer Academic Camps, Building Your Futures, Leap into Careers, and other college readiness programming delivered to more than 3,500 young people.

Nebraska 4-H ensures that youth have knowledge and an appreciation of agriculture, Nebraska's largest industry. Signature program efforts included the Ag-Citing Science school enrichment program delivered to nearly 700 youth and 15 Agricultural Literacy Festivals, which reached more than 5,500 young people.

Nebraska 4-H is fostering youths' commitment and contribution to their communities. Signature program efforts included 7 Habits of Highly Effective Teens, We the People, and Focus on Citizenship, which reached approximately 250 young people.

Nebraska 4-H is committed to preparing youth to pursue a post-secondary education. Annually, former 4-H'ers who participated in 4-H through their high-school career are surveyed regarding their post-secondary plans after their first semester in college. Results are presented below.

Results

In Nebraska, one in three age-eligible youth across all 93 counties are enrolled in 4-H, for a total enrollment of approximately 140,000 youth. Of those youth, nearly 50,000 participated in school enrichment experience; over 33,000 Nebraska youth were members of a 4-H Club; and nearly 11,000 youth and adults participated in 4-H camping programs. In addition, 12,000 volunteers shared their time and resources with Nebraska 4-H.

Results of specific program efforts follow:
- 87% of youth in the GEAR-Tech 21 program are excited to learn more about science and twp in three youth are interested in a career in science.
- 81% of youth in Animals Inside and Out can successfully identify multiple animal by-products and 87% reported an increased interest in Animal Science.

- 79% of youth in the Outdoor Skills program agree that science is important in solving everyday problems and 84% learned problem-solving skills they can use in school.
- 80% of youth were able to correctly identify the source for milk, vegetables, proteins, and grains.
- 72% of youth knew agriculture is the largest industry in Nebraska.
- 78% could identify someone they know who has a career in agriculture.
- 98% of youth participating in Connecting the Dots understand their opportunities for post-secondary education in Nebraska; a 24% increase from before the program.
- 62% reported an interest in attending the University of Nebraska-Lincoln in the future.
- 75% plan to live and work in Nebraska after college.
- 78% of youth in the 7 Habits of Highly Effective Teens have developed a personal mission statement and goals; an increase of 35% from before the program.
- 98% of youth in community-engaged programs report that they value differences in others.
- 78% report having an opportunity though 4-H to contribute to their community.
- 96% are pursuing post-secondary education.
- 32% are attending the University of Nebraska-Lincoln.
- 93% have identified a major and 64% report that their selection was influenced by their 4-H project participation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #3

1. Outcome Measures

Youth will increase behaviors that result in healthier lifestyles.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	48250

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nebraska ranks 10 in the United Health Foundation's America's Health Rankings for 2014. Obesity increased to 29.6% and diabetes increased by 10% from 8.4 percent to 9% of adults. This has a negative impact on Nebraska's economy because of missed work and higher health care costs. In addition, because parents are often the food providers in the home, negative food behavior of adults leads to negative behavior in children and a more serious obesity spiral.

Despite these sobering statistics, changes are occurring. In the past year:
- children in poverty decreased by 27% (from 19.6% to 14.3%).
- immunization coverage among children increased by 9% (from 72.6% to 79%) of children ages 19 to 35 months. Nebraska has the second best child immunization coverage in the nation.
- preventable hospitalizations decreased by 13% (from 63.8 to 55.8 per 1,000 Medicare beneficiaries).

What has been done

Nebraska Extension provides food, nutrition, and health programming to an array of audiences through a variety of teaching methods. Extension provides resources for use in daily life and in environmental, economic, health, and community crises and emergencies.

Program participants are impacted through one-on-one education, group settings, health fairs, on-line and distance programs, social media such as Pinterest, Facebook, Instagram and Twitter, newsletters, blogs, web page development, mobile applications, and media. USDA/NIFA/AFRI grants with multi-state partners are focused on childhood obesity, food safety, and food security.

Nebraska Extension provided timely, relevant, and research-based information to media outlets, peer-reviewed publications, and presentations, and won individual and team awards at state, regional, and national levels. Collaborators include multi-state groups, Nebraska Department of Health and Human Services (DHHS), county and district health departments, USDA, Nebraska Department of Education, Community Action Partnerships, Action for Healthy Kids, Restaurant Associations, hospitals, and senior programs.

Nebraska Extension and the DHHS Supplemental Nutrition Assistance Program offers lessons in the areas of diet quality, food safety, and food resource management for the culturally diverse, limited-resource audiences in either individual or small groups.

Nebraska 4-H helps youth understand the impact of personal decisions. Signature program efforts included 4-H Healthy U, the Healthy Living Skill-a-thon, and a new 4-H Foods Contest at the Nebraska State Fair. These programs reached approximately 250 young people. Additionally, hands-on activities in the areas of nutrition, physical activity, hand washing, food preservation, food preparation, and decision making were delivered to 11,500 youth.

In 2014, approximately 38,000 youth and 15,000 adults were reached with programming related to healthy lifestyles. Extension publications in this content area have been downloaded over 48,000 times and newsletter listserv subscribers total almost 9,000. Since 2010, http://food.unl.edu had over 5.2 million page views and 2.6 million users. Creating healthier eating patterns, increasing physical activity levels, improving health management practices, and reducing foodborne illness are top priorities to reach the goal of improving health and reducing social and economic costs for Nebraskans.

Results

Program examples and their results follow.

Food Smart Families: Helping Youth Make Healthier Choices: More than 1,000 hours were devoted to teaching healthy living programs to over 14,000 youth across Nebraska. A grant-funded initiative, the 4-H Food Smart Families program, reached 2,945 youth. As part of this undertaking, 14 youth ambassadors were trained to assist with presentations. Sessions were conducted at 11 sites across the state. Because of program participation youth agreed to strongly agreed that they:
- Learned what foods they should eat everyday (96%).
- Learned how to make healthy food choices (94%).
- Thought their family has prepared healthier meals (90%).
- Learned cooking skills (86%).
- Learned skills for buying food on a budget (80%).

Discovery Neighborhood: Youth Food Safety Education Program: A six- lesson food safety curriculum was developed for K-5th graders using conversation map methodology and experiential learning activities. Each lesson focuses on one FightBac! food safety concept with age-appropriate activities. Cartoon characters help youth learn curriculum concepts, and each lesson has an optional food activity that reinforces main concepts. A family newsletter is also distributed for youth to share at home. The curriculum was piloted in after-school settings in three different communities. Participants in the pilot showed an increase in knowledge for:
- hand washing (17%).
- cleaning and positive identification of items that contaminate surfaces (12%).
- separating (10%).
- cooking (30%).
The curriculum can be used in after-school or in-school settings and is now available throughout Nebraska and for purchase nationally at: http://go.unl.edu/7gti.

Worksite Wellness: Adults Achieving Healthier Outcomes: Working in partnership with Nebraska DHHS and WorkWell, Nebraska Extension designed and delivered a seven-week series of "food and fitness" webinars intended to meet workplace wellness requirements and to be offered at a low individual fee. Offered twice during the year (spring and fall), a total of 172 employees from 40 companies/organizations enrolled. The format allowed Extension educators to collaborate on programming and ensured consistent message delivery. Webinars could be viewed live or recorded, which provided flexibility in viewing and increased participation. Post-pre program survey results (45% return rate) included:
- About 82% of survey respondents viewed all webinars.
- Overall improvements were noted in healthier eating habits (73%), increased physical activity levels (51%), and weight loss (14%).
- Approximately 90% agreed to strongly agreed that the information was useful, up-to-date, and they learned something worthwhile.

Potential savings for rural Nebraskans totals nearly $6.8 million on prescription costs because of extension's Medicare education and enrollment assistance since 2005. In its 14-year history, calculated savings in medical costs for Control Diabetes for Life participants equates to $6.3 million.

SNAP-Ed reached 5,324 adults (78% of graduates improved in one or more food resource management skills and 84% improved in at least one nutrition practice) and 20,436 youth. EFNEP reached 1,938 adults (81% improved in at least one food resource management skill and 86% improved in at least one nutrition practice) and 1,912 youth.

Nebraska 4-H Inspiring Healthier Living programs results indicate:
- 90% know the value of a healthy, balanced diet.
- 89% reported plans to encourage their families to eat meals together.
- 93% learned how to deal with stress in positive ways.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
703	Nutrition Education and Behavior
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities

Brief Explanation

Research and extension have been able to successfully meet goals as planned in the area of people and their well-being. Nebraska Extension continues to be cognizant of over-arching issues such as feeding 9 billion people, global water supplies, and how those will impact our work related to educating Nebraskans on healthier lifestyles and creating a well-educated workforce.

Research and extension faculty continue to be watchful for emerging issues and world conditions that could change food systems and the global trust that consumers have of U.S. agriculture. In addition, UNL faculty are at the forefront of basic research in food allergies, food safety through the food chain, and microbiome profiling.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Nebraska Extension has developed an impact report for each of its Action Teams. These can be found on our Extension impact page at: http://www.extension.unl.edu/makingadifference.

The Nebraska Agricultural Experiment Station measures its success in our ability to provide

Extension with cutting-edge research results that impact Nebraska. In addition, we have begun to use a commercial product (Academic Analytics) to assess faculty productivity measures.

Key Items of Evaluation

Nebraska Extension continues to identify signature outcomes and indicators in each of its programming areas and is collecting statewide data to assess progress made toward achieving those outcomes. In 2014, each extension Action Team completed an outcome report highlighting their efforts and the impact of those efforts on clientele. These reports have been instrumental in working with stakeholders, who in turn used them to advocate on behalf of the extension program. Additional efforts are underway to enhance the skills of Action Team leaders in order to strengthen selected indicators and evaluation strategies.

Information regarding Academic Analytics can be found at: http://www.academicanalytics.com/

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
0	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.