2013 University of Nebraska Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

The Institute of Agriculture and Natural Resources (IANR) is 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 insure 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 plain 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. 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 dotting the Nebraska map, discussions between faculty/administrative leaders with 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 debated at round-table discussions throughout the year. A given throughout the process was critical 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://ianrhome.unl.edu/innovation#eval.

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 at 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 residents; and teaching tomorrow's professionals through formal and non-formal learning settings. The on-going 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 non-formal settings, and in the placement of graduates in their careers.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	221.0	0.0	180.0	0.0
Actual	228.0	0.0	140.0	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 2013 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 and Community Partners (FCP), reviewed the strategic objectives that address food, fuel, water, landscapes, and people. These groups provided suggestions as refinements were made to these long term goals and particularly the FCP focused on the intersection of the needs of children, youth, families, and entrepreneurship with these 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, Crops for the Future, Child and Youth, Community Vitality Initiative, Food-Nutrition-Health, Water and Environment). Teams were composed of educators and specialists working in these subject matter areas. Based upon the issues impacting the state and region, teams refined the educational programs delivered. They reviewed the evaluation tools developed to aggregate impact data for programs taught. Additionally each of the action teams periodically interact 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. Additionally, 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 of the IANR tenured faculty have joint research/extension appointments, hence the research and the extension content areas in which they work are aligned and their research/extension work is more seamless.

Two off-campus research units (which also incorporate Extension programming) completed their six/seven year reviews in 2013. Teams comprised of external panel members and University of Nebraska-Lincoln faculty members reviewed the self-study documents, and interviewed and asked questions of faculty,

administrators and recipient stakeholders of the units. The goal being to help ensure that direction of the units is future focused and programs are relevant and high quality.

III. Stakeholder Input

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

- 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 and on the left hand side column of the homepage to see 'Making a Difference.') Impact reports are printed annually for each action plan (and some related areas), each includes public value statements. Begun in 2009 the public value statements were written to help stakeholders understand the value of and differences being made by today's Extension 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. Extension in 2010 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, 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 the third for formal education audiences is 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. In each case these entities want to reach a specific audience. While not typical of all communities with Hispanic residents, this is an excellent 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 other communities with Hispanic residents, educational programs are more typically directed to Hispanic youth and families involved in EFNEP/SNAPED. In addition, we are working to increase Extension Educators who can target diverse youth audiences. For example, Extension recently hired a Spanish-speaking 4-H Educator in northeast Nebraska to target underserved audiences.

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
- Other (In programs to address diverse audiences and hiring of a diverse faculty.)

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 for input when the selection of an administrator is required. For example, stakeholders are contacted to provide input, through personal invitation and media releases, to participate in receptions and seminars as candidates are invited to interview. Selected stakeholders serve as members of search committees for unit administrators (department heads, 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 its focus on critical issues facing Nebraska. They expect this 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. Issues related to rural community vitality have surfaced in recent years. The University of Nebraska system established in 2013 a Rural Futures Institute, hired an Executive Director and staff, and initiated a new Community Vitality Initiative within Extension, engaging more than 15 faculty from youth, agricultural, and entrepreneurship extension programs for this new initiative.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
4590156	0	3900093	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	4704984	0	4345363	0
Actual Matching	4590156	0	3989556	0
Actual All Other	0	0	0	0
Total Actual Expended	9295140	0	8334919	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	808519	0	1388741	0

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Global Food Security and Hunger
2	Climate Change
3	Sustainable Energy
4	Childhood Obesity
5	Food Safety

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger

☑ 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
121	Management of Range Resources	10%		2%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		8%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	2%		7%	
205	Plant Management Systems	28%		7%	
206	Basic Plant Biology	0%		6%	
211	Insects, Mites, and Other Arthropods Affecting Plants	4%		7%	
212	Pathogens and Nematodes Affecting Plants	4%		14%	
213	Weeds Affecting Plants	4%		6%	
215	Biological Control of Pests Affecting Plants	0%		1%	
216	Integrated Pest Management Systems	4%		5%	
301	Reproductive Performance of Animals	1%		6%	
302	Nutrient Utilization in Animals	4%		11%	
303	Genetic Improvement of Animals	1%		1%	
305	Animal Physiological Processes	1%		9%	
307	Animal Management Systems	20%		6%	
402	Engineering Systems and Equipment	1%		3%	
601	Economics of Agricultural Production and Farm Management	6%		1%	
806	Youth Development	10%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890

Plan	110.0	0.0	111.0	0.0
Actual Paid Professional	92.0	0.0	84.0	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**
1908385	0	2731152	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1744259	0	2538254	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 life and natural resource sciences that underpin and will support future productivity and sustainability advances in agriculture.
• 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.

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 (including Natural Resource Districts, Department of Natural Resources, Department of Agriculture, Department of Environmental Quality, Natural Resources Conversation Service) 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 eight 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 2012 (most recent time for which statistics are available), 23,000 visits to eXtension originated from Nebraska resulting in 67,000 eXtension Seb page viewings. In addition, 325 Ask an Expert questions

originated from Nebraska and 413 responses were supplied by UNL Extension faculty. UNL Extension has 356 faculty and staff with eXtension IDs, 159 faculty represented as members of 49 of 73 CoPs and 18 who provide leadership for CoPs.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	21500	2000000	74400	0

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

Patent Applications Submitted

Year: 2013

Actual: 9

Patents listed

Improved Production and Yield Capacity of Transgenic Plants Expressing a Genetically Engineered Version of the Dicamba Monooxygenase Gene (aka, oxygenaseDIC).

A method for improved plant yields.

Methods and Compositions for Obtaining Useful Plant Traits.

Broccoli Bits: An ingredient for snack food processing.

Plant Rubisco Expressed in Chlamydomonas.

Wireless Phenotyping Hyperspectral Reflectance Field Instrument.

Method for the production of substituted polysaccharides via reactive extrusion.

Drought adaptive root gene in wheat - E2F.

Silencing of RNA Interference Pathway Genes in the Western Corn Rootworm.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	36	219	255

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Percentage of Agricultural Research Division HATCH projects in global food security and hunger.

Year	Actual
2013	59

Output #2

Output Measure

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

Year	Actual
2013	1200

Output #3

Output Measure

- Number of new extension publications and other education resources related to global food security and hunger.

Year	Actual
2013	36

Output #4

Output Measure

- Number of new products and decision tools developed and made available to clientele related to global food security and hunger.

Year	Actual
2013	12

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 will have access to higher educated workforce trained in the new biology with skills applied to addressing critical science in global food security and hunger.

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
2013	250000000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
UNL Extension hosts seven umbrella websites for combining content from a faculty team under a common theme. These umbrella websites target the work of UNL Extension's eight action teams. Our Extension Beef web site experienced an 85% increase in Unique Visitors (212,000), 65% increase in Repeat Visitors, 75% increase in Page Views (422,000) and 8,800 webinar views. A new BeefWatch newsletter reached 679 subscribers by end of the year with 78 articles and 98,649 page views. Our Food web site addressing consumer issues as well as local foods production topics received 1,331,000 unique visitors and 2,221,000 page views. The CropWatch web site received 363,000 unique visitors and 870,000 page views. The Water web site received 94,000 unique visitors and 215,000 page views.

What has been done
Our Beef Action Team has focused on recovery from the drought, research updates, and economic sustainability topics has been a primary focus on much of our beef and grazing related education programs. Examples include:
* Returning to the Ranch targeting improvement in the legal and estate planning for families integrating the next generation into the business.
* West Central Cattlemen programs were conducted at 10 locations in Nebraska, Colorado and Kansas targeted cow leasing; economic implications of herd management decisions during drought; feeding corn stalks to cows; pasture weed management after drought.
* Ranching for Profitability workshops targeted on dry-lotting cows, limit feeding cows & alternative forages during drought
* Two in-depth Ranching Practicums (one jointly delivered with Colorado and Wyoming) equivalent to a 3 hour college course. The Tri-State Ranch Practicum Capstone Course was designed to help beginning ranchers create and enact a business plan and to network with key

industry leaders.
* Husker Mobile Beef Lab targeting youth science and agricultural literacy with a mobile lab that exposes elementary-age youth to a fistulated steer and laboratory instrumentation for viewing rumen microbes. The lab has traveled to schools, fairs, science fairs, and field days reaching more than 7,900 youth in 2013.
* An on-going funded USDA-AFRI project to build a novel genomic validation population (over 45,000 DNA samples, 800 animals with feed intake data, breed association data from seven beef breeds) based upon collaboration with ARS Meat Animal Research Center.

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 program engaged 35 growers representing 46 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).
* Youth Corn Challenge is being piloted in 2013 with 4-H and FFA members working in teams. In 2013, 11 teams (25 youth) signed up with five teams (14 youth) completing the actual challenge plots and harvest report forms. This program parallels the Nebraska On-Farm Research program but with youth as the target.
* CropWatch newsletter and web site combining content from large multi-disciplinary faculty team with weekly newsletter reaching many farmers and most consultants in Nebraska.
* Soybean Cyst Nematode program includes a field days at four locations, SCN sampling program for producers (1,080 samples were processed in 2013), and testing of 34 soybean varieties at four locations in 2013 to test SCN resistance.
* High Plains Advanced Cropping School on sugarbeet educated crop insurance adjusters, industry professionals, and producers about various aspects of sugarbeet management (insect, disease, weed, soil and nutrient management, varieties/hybrids, growth stages, and irrigation management) in a field-lab setting.
* Small Farms conference focused on bringing information about incorporating alternative agricultural enterprises into diversified, small farms

Farm management related education was the focus of the following programs:
* Estate Planning and Business Transition programs addressed understanding of estate planning and use of estate vehicles to transfer wealth.
* Marketing In a New Era (MINE) is a statewide effort to help farmers acquire skills and knowledge related to marketing corn and soybeans. Producers play a real-time simulation (farm marketing game) that provides real market characteristics while receiving education about commodity marketing.
* A Land Management Program presented at 29 locations across the state focused on land rental arrangements.

Results
We estimate that in 2013, Extension faculty hosted educational experiences (inclusive of workshops, distance learning experiences, and media related education) that reached 162,000 contacts on beef issues, 198,000 contacts on cropping systems issues, 46,000 on water/climate/environmental issues related to agriculture, and 113,000 contacts on water/climate/environmental issues related to communities. Workshops, field days, webinars, and other direct teaching experiences are estimated to have reached 5,900 learners with almost 9,000 learner-hours of education on livestock issues (67% which relates to global food outcome); 4,461 growers and advisors (representing 25.6 million acres of cropland) participated in about 20,000 learner-hours of education on cropping systems issues (75% which relates to global food outcome); 4,600 learners with almost 11,000 learner-hours of education on agricultural water and

environmental issues (50% which relates to global food outcome); and 27,000 learners with more than 39,000 learner-hours of education on community water and environmental issues (20% which directly relates to global food outcome).

In 2013, 23 beef education programs were evaluated across the state several months after completion. Participating were 981 producers and other agribusiness specialists representing over 3.5 million head of livestock and 2.5 million acres. Over 600 participants responded in a post-workshop evaluation about the impact of attending these programs:
* 94% indicated moderate to significant knowledge gained in one or more subject matter areas.
* 53% indicated plans to improve current practices or begin new practices in one or more subject matter areas.
* Respondents estimated an average value in profitability of $16 per head. Based on an estimated average value of $16 per head in profitability, these changes represent approximately $30 million for the 981 participants.

Impacts for individual beef educational efforts are summarized below:
* Ranching for Profitability educational programs reached 300 participants representing 788,500 acres, and 887,000 cattle. Participants reported a total increased profitability of $16 million.
* Tri-State Ranch Practicum Capstone Course reached 40 producers with a reported impact of $14.47 per head on 16,121 head of cattle. Thirty-one participants in the 2013 Nebraska Ranch Practicum influenced decisions on 152,088 acres and 13,011 head of livestock and reported the value of the Practicum at $20/head. In addition, 100% of participants reported improved skills in monitoring vegetation and livestock and 100% indicated they would make management changes.
* Feedlot Roundtable and Feedlot Schools impacts affected 3,265,815 head of cattle; 1,240,528 acres of cropland and increased profitability by $15 per head.
* The impact from the Husker Nutrition Conference, affecting 2.8 million head of cattle by the influencers that attended the meeting, was estimated at a value of $10-$15 per head. Over 63% were likely or very likely to make changes from information presented.

Research in heifer development and fetal programming led by UNL has impacted research programs across the U.S. and world including USMARC at Clay Center, LARRL at Miles City, Mont., University of Wyoming, North Dakota State University, the University of Arkansas, Kansas State University, Montana State University, South Dakota State University, Agri-Food and Biosciences Institute, Ireland, Brazil, and Argentina. The economic impact of research program to the beef industry is estimated to be over $180 million dollars.
* UNL CropWatch team survey of 166 users reported learning that 71% changed at least one practice in 2013 as a result of information presented in UNL CropWatch and experienced an average savings/acre as a result of changed practices of $7.98/acre over 139,000 acres (value of $1.1 million in savings).

4. Associated Knowledge Areas

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

215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management
806	Youth Development

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
2013	60

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
To remain economically viable and environmentally compatible in a rapidly changing world, Nebraska ranchers and feeders and related agribusiness representatives must obtain and incorporate new research-based knowledge as quickly as possible in order to gain efficiencies, be better stewards of our natural resources, and take advantage of new opportunities. UNL Extension's five spires of excellence target Beef Cattle Systems and Crops for the Future around which teams of faculty assemble to plan and deliver educational programs statewide.

What has been done
One of UNL Extension's primary educational programs targeting sustainability focus is it on issues related to efficient and sustainable use of water for irrigation and sustaining its accessibility into the future. This program is described in greater detail in the Climate Change outcome. Sustainability of grassland resources is another focus area for Extension. Many of these programs are integrated into our Beef Systems educational programs that were detailed in Outcome 1 of the Global Food program area. In fact, almost all UNL Extension programs that target productivity and profitability (Outcome 1) and sustainability (Outcome 2) are fully integrated in addressing issues. Please refer to "What Was Done" for Outcome 1 as the primary summary of programs that could also be listed for this outcome. Several additional educational efforts

targeting environmental sustainability are summarized below:

* Grazing/Baling of Cornstalks: A faculty team's on-farm research initiative on the effects of baling and grazing cornstalks on next year's yield at five sites in a wide range of climatic conditions. The project targets utilization of an alternative feed source for grazing, implications for soil productivity during future years, and animal performance. Cornstalk grazing is seen as an untapped forage resource in Nebraska and critical to future growth in Nebraska's beef herd. This on-farm research will be coupled with future educational programs and existing research-based information from two long-term university research sites.

* UNL faculty provide leadership for the Livestock and Poultry Environmental Stewardship Learning Center (eXtension team and website). Key products generated in 2013 include the production of six new webinars for a national audience, initiation of a YouTube channel (http://youtube.com/lpelc) and implementation of the first Waste to Worth national conference. State-focused education topics include composting mortality, vegetative treatment systems for feedlot runoff, and environmental management within the Pork Quality Assurance program.

4-H Livestock Quality Assurance Moodle Course - In 2012 UNL Extension made the state required youth livestock Quality Assurance (QA) available online through an eXtension Moodle course targeting issues related to animal care and well-being. The new course is broken down by three age groupings, Junior (9-10), Intermediate (11-14), and Senior (15-18), to better accommodate the various levels of learners. In 2013, the team introduced 28 new modules and continued to expand the in-state delivery to 5,400 youth with 3,418 Nebraska youth completing the three modules required for Quality Assurance. Additionally, the team is working with five other states currently considering adopting the curriculum for their 4-H Quality Assurance needs.

A new Crop Management Diagnostic Clinic was initiated to focus on Soil Quality and Water Use Efficiency in 2013. The class was sold out with 80 participants and discussions are underway with state natural resource and environmental quality agencies as well as USDA NRCS to make this field clinic program a part of their staff professional development.

The Field to Market Pilot Program is in its third year with a team of agricultural industry partners including Bunge, Kellogg, Keystone Alliance and 22 local corn growers. Field to Market is a tool that focuses on defining and measuring the sustainability of food and fiber production, giving growers outcome-based metrics. In turn growers can analyze operations and environmental impacts and food companies can better explain how natural resources are being managed.

Results

Faculty involved with state and national efforts addressing animal manure management accomplished the following in 2013:
* Three recent UNL products are used extensively by the livestock industry including the Nebraska P-Index (downloaded more than 850 times in 2013).
* Manure Value Calculator (downloaded 10,250 times since released), and 900 copies of the 2013 Nutrient Management Record Keeping Calendar were in circulation.
* Certified more than 100 Pork Quality Assurance program advisors and producers who impact management decisions for the 2.75 million pigs in Nebraska.
* Education led to receipt of more than 70 certificates for CEUs from the American Registry of Professional Animal Scientists on the design and management of large animal mortality composting facilities with 62 attending a recent educational event.
* At the Beef Facilities conference, via the LPELC and a multi-state team, more than 300 attendees received new information on manure management and air quality regulations as related to animal agriculture and climate change. This information was made available through a

national symposium (80+ attendees), an online course (100 registrants), and a website (4895 page views) with the leadership of a national team.
* 2013 LPELC webinars were attended by an average of 78 live participants with over 95% of viewers indicating they gained knowledge from the presentations. The highest reported intended uses for the knowledge were: professional development (67%); recommendations for producers (59%); regulatory/policy development (27%); and extension programs (18%). The LPELC YouTube channel (http://youtube.com/lpelc) experienced over 57,000 views with an estimated 251,000+ minutes of video watched by viewers. On average, viewers watched 4:22 minutes (approximately 26% retention) which is considerably longer than is reported in popular press for typical habits on YouTube. The LPELC web site experienced received 248,893 page views in 2013.The Waste to Worth conference's 248 participants indicated that 100% being able to use something presented in conference within their work and 65% were more motivated to use stewardship knowledge in future educational programming. Resources from the conference will published on the LPELC web site have received over 16,000 page views.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
307	Animal Management Systems
402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management
806	Youth Development

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
2013	9600

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The 2012 Nebraska Groundwater Quality Monitoring Report states "The data does indicate that overall, since the 2005 report the number of analyses for nitrate greater than 10 mg/l has decreased. As discussed previously in this report, data from 1994 to 2012 is more representative of the "statewide" concentration of nitrogen and indicates a slight upward trend. Utilizing the data from the NRDs' Statewide Groundwater Monitoring Network, for both short term and long term analysis, there are a greater number of wells that show an increase than show a decrease. There is not enough recent data for atrazine, alachlor, metolachlor, or simazine to conduct any trend analyses." The 2012 Water Quality Integrated Report defines long term trends for atrazine in 10 lakes and 26 streams. The analysis suggests that atrazine levels are declining in four lakes and six streams, remaining stable in two lakes and 18 streams, and increasing in one lake and two streams.

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 demonstrating practices and technologies for minimizing resistance.

The Commercial/Noncommercial Pesticide Safety Education Program currently licenses over 9,837 people as commercial and noncommercial pesticide applicators in Nebraska with approximately 3,132 commercial/noncommercial pesticide applicators trained in 2013. The 2013 Private Pesticide Safety Education Program trained more than 6,500 participants with a total of 21,266 private applicators certified in Nebraska.

In 2013, the Pesticide Safety Education program developed nine new publications, one pesticide record keeping app for mobile devices, 18 videos shorts, four full length training videos and four presentations to support trainers.

Primary delivery mechanisms for 2013 programs included an Educator Forum (train the trainer workshop), eight crop production clinics, multiple IPM School targeted clinics, pesticide container recycling program, and two private applicator workshops. In addition the innovative application of Web tools includes a Pest Private Eye video game and pesticide safety staff connecting with clientele through Facebook, Twitter, You Tube, and blogging to connect with clientele.

Results

Private Pesticide Safety Education Program: The 2013 participants indicated that past pesticide safety education has frequently or very frequently produced reductions in pesticide use (26% of participants), regular monitoring to correctly identify pest problems (76%), safe pesticide storage, handling and application practices (92%), application of BMP to reduce contamination (91%), and use of IPM control strategies (74%). Examples of behavioral change as a result of their participation in private PSEP include:
* 96% make pesticide applications according to the pesticide label
* 95% take steps to prevent carrying pesticide residues into the home
* 94% use PPE to protect their health
* 89% take appropriate steps to prepare for pesticide spills

Commercial/Noncommercial Pesticide Safety Education Program: 2012 participants indicated that pesticide safety education has produced reductions in pesticide use (35% of participants), regular monitoring to correctly identify pest problems (86%), safe pesticide storage, handling and application practices (92%), application of BMP to reduce contamination (88%), and use of IPM control strategies (83%). Examples of behavioral change include:
* 98% make pesticide applications according to the pesticide label
* 98% take steps to prevent carrying pesticide residues inside their home
* 94% use PPE to protect their health
* 91% calibrate their equipment at least once a year
Crop Management & Diagnostic Clinics: About 42% of participants learned new knowledge about fungicide use in soybeans and strategies to reduce resistance; 45% of the participants learned more about the role of natural enemies in crop insect control; 47% gained knowledge on glyphosate resistant weeds; 53% learned new knowledge of use of adjuvants and carriers to increase efficacy and reduce potential drift.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
806	Youth Development

Outcome #4

1. Outcome Measures

Nebraska will have access to higher educated workforce trained in the new biology with skills applied to addressing critical science in global food security and hunger.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

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

What has been done
Extension: Extension provides in-depth education leading to certification for crop consultants (Crop Management Diagnostic Clinics discussed previously), Commercial Pesticide Applicators (discussed previously), well drillers, and rural septic system installers. In addition, Extension faculty deliver in-depth education to agricultural producers and other clientele in the area of DNA Technology and marker assisted selection for beef systems (over 120 workshop participants representing 40,000 head of beef cattle), Ranch Practicum for cattle producers using curriculum derived from the systems-based research of the University of Nebraska through (two eight-day courses worth 4 hours of undergraduate credit), and the Nebraska Agricultural Technologies Conference which engages farmers and agribusiness (80 participants in 2013) in emerging GPS related technologies, site specific management and on-farm research. UNL Extension in cooperation with the Nebraska Corn Board has initiated a transformational education program for engaging top crop farmers and 4-H and FFA youth in on-farm research programs to gather production performance for common management and technology use decisions.

Results
In 2013, there were 451 Baccalaureate and 158 Masters/Doctoral degrees conferred at the University of Nebraska in agricultural and natural resources related areas. Over 85% of our Baccalaureate degree students find jobs in their fields or continue with their professional education; approximately 70% take their first job in Nebraska.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
305	Animal Physiological Processes
307	Animal Management Systems
402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management
806	Youth Development

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: Extreme drought conditions arrive in Nebraska during the spring of 2012 and persisted through the remainder of the year. Residual effects of this drought reoccurred in central and southern regions of in Nebraska into 2013. Most grasslands recovered but reduced grass productions was common in 2013. An early winter storm in northwest Nebraska caused the death of several thousand head of cattle.

Economy: As the 2013 fall harvest neared, prices declined compared to 2012's record setting prices. Because of the high grain and forage costs through the first half of the year, livestock farmers experience continued high feed costs and losses until late in 2013. In addition, the decline in cow numbers resulting, in part, from the 2012 drought resulted in fewer calves and yearlings for placement in feedlots and declining meat supplies. By the end of 2013, beef prices were setting record highs. In addition, the appearance of the PED virus in Nebraska swine herds as well as in many other swine producing regions produced a smaller supply of pork and record pork prices by the end of 2013. As a result of declining crop prices, land value increased by only 5% in 2013 and land rental rates declined.

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. These ethanol plants represent more than $5 billion in capital investment in the state and provide direct employment for some 1,200 Nebraskans. As of December 2013, Nebraska's operating production was 1.82 billion gallons per year, approximately the same level as this same time the previous year. With the decline in corn prices, Nebraska plants are expected to return to production levels closer to full capacity. However, due to California restrictions, RFS policy debates in Washington, and limitations of ethanol sales resulting from E-10 mixes of ethanol and gasoline are currently restricting growth of ethanol production.

Public policy and Government Regulations: Lack of a five-year farm bill was the primary public policy discussion in 2013. Disappearance of all USDA safety nets for ranchers experiencing extreme drought and other weather related losses will prevent cow numbers from recovering anytime into the near future.

Appropriation Changes: Steady state tax collection and soaring federal deficits has led to static state and declining federal budget support in 2012. The end of federal sequester should allow Extension programs to hold steady into 2014. However, the continued growth in student enrollment has resulted in UNL adding 36 new positions in 2013, with approximately six having Extension responsibility, with more faculty position additions anticipated in 2014.

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

UNL Extension has five spires of excellence with two action teams specifically targeting global food security issues: 1) Beef Systems and 2) Crops for the Future. The Action Team supporting each spire has identified one or more "Signature Outcomes" that first became active at the start of 2010. These "Signature Outcomes" continue to be delivered statewide in 2014 and establish methodologies for measuring statewide impact that allowed capture of a significant part of our 2013impact (see "Making a Difference" at http://extension.unl.edu). The faculty team supporting each spire is in the process of implementing 2014 statewide delivery and evaluation procedures identified in the statewide action plans. These methods developed by our Action Teams provided our third statewide snapshots of educational program impacts including knowledge gain, intended and actual practice change, and likely conditional changes.

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. We are still in the process of determining the robustness of this dataset.

Key Items of Evaluation

Extension action team implementation plans, evaluation indicators and tools as well as 2013 Impact reports are all found at http://www.extension.unl.edu/web/Extension/progfocus. A review of the specifics of these implantation and evaluation plans are found for the two most relevant action teams by going to http://www.extension.unl.edu/web/Extension/progfocus/actionteam-beef and http://www.extension.unl.edu/progfocus/actionteam-crops-of-the-future

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Climate Change

☑ 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	25%		13%	
111	Conservation and Efficient Use of Water	14%		17%	
132	Weather and Climate	4%		8%	
133	Pollution Prevention and Mitigation	5%		19%	
135	Aquatic and Terrestrial Wildlife	5%		6%	
141	Air Resource Protection and Management	4%		1%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		6%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	7%		13%	
302	Nutrient Utilization in Animals	4%		6%	
305	Animal Physiological Processes	0%		3%	
307	Animal Management Systems	4%		3%	
403	Waste Disposal, Recycling, and Reuse	4%		1%	
405	Drainage and Irrigation Systems and Facilities	14%		0%	
605	Natural Resource and Environmental Economics	10%		4%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	49.0	0.0	38.0	0.0
Actual Paid Professional	55.0	0.0	33.0	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**
1016532	0	942041	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
963933	0	916316	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.
• Collect, disseminate, and model climate change data essential for understanding the impact of climate on natural resource and agricultural systems.
• 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 in the face of environmental stress/climate variability.
• Conduct research and extension programs to develop/deliver new and improved information to help producers create sustainable crop and livestock production programs with improved environmental impacts.

2. Brief description of the target audience

Nebraska farmers and ranchers, along with landowners, are the primary target audience for this work. In addition, target audiences will include land managers, bankers, agricultural consultants and agribusiness professionals who provide products and services to farmers and ranchers. The program's research and education efforts will provide valuable information for state and local policy makers (especially Natural Resource District Boards of Directors) as their 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 was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	14300	377000	51600	0

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

Patent Applications Submitted

Year:	2013
Actual:	1

Patents listed

Drought adaptive root gene in wheat - E2F.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	14	97	111

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Percentage of Agricultural Research Division HATCH projects in climate change.

Year	Actual
2013	26

Output #2

Output Measure

- Number of workshops, continuing education programs, web-based curricula and field days/tours related to climate change.

Year	Actual
2013	494

Output #3

Output Measure

- Number of new extension publications and other education resources related to climate change.

Year	Actual
2013	14

Output #4

Output Measure

- Number of new products and decision tools developed and made available to clientele related to climate change.

Year	Actual
2013	6

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	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	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.
3	Nebraska will not exceed its allocation of water in the Republican River as allowed by the interstate compact with Kansas and Colorado. Nebraskan's allocation is 49% of the average annual water supply. The output measure will be the percent of the Republican River average annual water supply used by Nebraska.
4	Nebraska will have access to higher educated workforce trained in the new biology with skills applied to addressing critical science in climate change.

Outcome #1

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
2013	6600000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
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. Drought conditions in the southern and central plains states over the last three years have produced declines in cow herd size and resulting calf crop. Nebraska's calf crop has declined by 2.8% from 2003 to 2012 while the US calf crop declined by 8.8%. Lower beef production levels began showing up in the market with record market cattle producers being seen at the end of 2013. In addition, prices for feed grains, and ethanol and distiller's co-products have resulted in profitability returning to cattle production late in 2013. Adapting to drought condition, 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
Faculty collaborated with the National Drought Mitigation Center to present a webinar series, "Drought Preparedness of Great Plains Ranches." This five-part series had an average of 100 live participants and was recorded for later viewing. Additional resources were developed for Nebraska's drought response including six archived webinars and three Nebguides.

The West Central Cattlemen programs, conducted at 10 locations in Nebraska, Colorado and Kansas, addressed economic implications of herd management decisions during drought, feeding

corn stalks to cows, and pasture weed management after drought. A Panhandle faculty team taught 19 sessions to 606 individuals on dry-lotting cows, limit feeding cows, and alternative forages during drought as part of the previously mentioned beef educational programs. A Beef Profit Team presented four educational programs in northeast Nebraska on drought strategies for cow/calf producers on management and production options such as herd culling strategies and feeding low quality feedstuffs. Finally, a central Nebraska faculty team targeted drought management in seven educational programs.

The Web continues to be used extensively for providing access to research based information on drought topics. The beef team has authored a wide range of written resources, webinars, and short videos that have been made accessible through UNL Extension Drought Resources (http://droughtresources.unl.edu), UNL Extension beef (http//beef.unl.edu), and YouTube (http://www.youtube.com/user/NUBeef).

Results

The central Nebraska drought educational programs reached 593 livestock producers, bankers, veterinarians and businessmen, representing 386,098 livestock animals and 626,498 acres. Producer profitability increased $22 per head with a 60% adoption rate (72% of producers said they were likely to make a change), creating a value of $5,100,000 to their operation. The northeast Nebraska beef series reached 164 producers and reported 65% would likely make changes in their operation as a result of attending the program. More than 50% plan to modify their current practices, and estimated an average value in profitability of $21 per head which translates into $996,000. The West Central Cattlemen programs reached 450 Nebraska, Colorado, and Kansas producers and other attendees representing over 250,000 head of cattle and more than 700,000 acres of rangeland. A survey of the Mid-Plains BEEF Educational Series (N=2 session, N=34 participants) suggested an increase in profitability of $515,000 for attendees through plans to modify current practices on utilizing crop residues and managing forage resources during a drought.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
132	Weather and Climate
141	Air Resource Protection and Management
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
307	Animal Management Systems
605	Natural Resource and Environmental Economics

<u>Outcome #2</u>

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
2013	100

3c. Qualitative Outcome or Impact Statement

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

What has been done
The Panhandle irrigation program started with the Pumpkin Creek project and has transformed into a regional effort to conduct education of producers about surviving under deficit irrigation conditions. Educational efforts from that project have been expanded in cooperation with three Natural Resource Districts with a focus on use of no-till for soil water conservation, timing of deficit irrigation, and dividing of limited water among different crops for maximum profitability.

NAWMN: The Nebraska Agricultural Water Management Network has grown to be the largest and most comprehensive water management network in the U.S. Network participants learn how to utilize soil moisture and evapotranspiration field measurement tools to make better-informed decisions in their irrigation management operations. Through extensive demonstration projects, the information is shared and delivered to Network participants and others through field days, seminars, workshops, outreach publications, website, Twitter, media reports, refereed journal articles, etc.

Monsanto Partnership: A partnership with Monsanto's Water Utilization Center resulted in a total of 24 sessions/tours at the Monsanto center, reaching 707 adults and youth. A total of 4,584 individuals have visited the center this past year and were exposed to UNL Extension materials and plot demonstrations. Three demonstrations and three research projects were planned and

implemented at the Learning Center in 2013.

Results
Water use in eight reporting Nebraska NRDs returned to levels approximately equal to pumping levels in 2005. Water use had steadily declined from 2006 to 2011 to about 65% of the 2005 level, increased to 208% of the 2005 level during the drought of 2012 and returned to a similar level as pumped in 2005 during 2013. In 2013, UNL Extension agriculture water management programs reached over 4,885 producers/consultants (representing 23.4 million acres of cropland) and over 2,080 youth.

The NAWMN has expanded from 15 farmer collaborators/partners in 2004 to over 1,100 in 2013. Since the beginning of the NAWMN, over 16,000 producers, crop consultants, and agricultural industry personnel have been reached and educated at over 600 Extension/outreach and in-service trainings. The irrigated acreage that was represented by the NAWMN partners increased from 1,482 acres in 2005 to near 1,500,000 acres in 2012. Participant surveys showed average irrigation water savings of 2.1 inch for maize and soybean consistently for the last nine years. With the total irrigated acreage represented by the Network partners, this resulted in a total of 310,000 ac-ft of reduction in water withdrawals, which represents roughly one-fifth of the total capacity of Lake McConaughy. This resulted in estimated total energy savings of over $60 million since 2005 statewide.

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
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

<u>Outcome #3</u>

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Republican River Compact allocates the water supply of the Republican River, originally set at 11% to Colorado, 49% to Nebraska and 40% to Kansas. Natural Resource Districts have developed plans that are contributing toward achieving the targeted allocation than includes retirement of irrigated acres, improvements in efficiency of irrigation water use, and limitations on irrigation development. Observed reductions in Nebraska water use (discussed later) are a result of extension education, public policy, and changes in rainfall patterns. Increases in 2012 due to drought have overshadowed water savings from recent years and returned to more normal levels in 2013.

The measure for Nebraska's consumptive water use in the Republican River basin are not available for public use for 2011, 2012, or 2013 due to litigation between Nebraska and Kansas.

What has been done
In addition, a joint UNL/Monsanto Deficit Irrigation program in the Republican Basin was hosted at three locations with 197 attendees. No additional new initiatives targeting the Republican River basin were reported in 2013. Extension Educators in the Republican River region are expanding NAWMN onto more producer farms in 2013. No accomplishment data specific to this region was reported in 2013.

Results
No new information for 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
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

Nebraska will have access to higher educated workforce trained in the new biology with skills applied to addressing critical science in climate change.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

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

What has been done

Results
In 2013, there were 451 Baccalaureate and 158 Masters/Doctoral degrees conferred at the University of Nebraska in agricultural and natural resources related areas. Over 85% of our Baccalaureate degree students find jobs in their fields or continue with their professional education; approximately 70% take their first job in Nebraska.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
132	Weather and Climate
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
141	Air Resource Protection and Management
201	Plant Genome, Genetics, and Genetic Mechanisms

203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
307	Animal Management Systems
403	Waste Disposal, Recycling, and Reuse
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Natural disasters: Extreme drought conditions arrive in Nebraska during the spring of 2012 and persisted all year. Residual effects of this drought reoccurred in central and southern regions of in Nebraska into 2013. Most grasslands recovered but reduced grass productions was common in 2013. An early winter storm in northwest Nebraska caused the death of several thousand head of cattle.

Economy: As the 2013 harvest neared, prices declined compared to 2012's record-setting prices. Because of the high grain and forage costs through the first half of the year, livestock farmers experienced continued high feed costs and losses until late in 2013. In addition, the decline in cow numbers, in part, from the 2012 drought resulted in fewer calves and yearlings for placement in feedlots and declining meat supplies. By the end of 2013, beef prices were setting record highs. In addition, the appearance of the PED virus in Nebraska swine herds as well as in many other swine producing regions produced smaller supply of pork and record pork prices by the end of 2013. As a result of declining crop prices, land value increased by only 5% in 2013 and land rental rates declined.

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. These ethanol plants represent more than $5 billion in capital investment in the state and provide direct employment for some 1,200 Nebraskans. As of December 2013, Nebraska's operating production was 1.82 billion gallons per year, approximately the same level as this same time the previous year. With the decline in corn prices, Nebraska plants are expected to return to production levels closer to full capacity. However, California restrictions, RFS policy debates in Washington, and limitations of ethanol sales resulting from E-10 mixes of ethanol and gasoline are currently restricting growth of ethanol production.

Public policy and Government Regulations: Lack of a five-year farm bill was the primary public policy discussion in 2013. Disappearance of all USDA safety net for ranchers experiencing extreme drought and other weather related losses will prevent cow numbers

from recovering anytime into the near future.

Appropriation Changes: Steady state tax collection and soaring federal deficits have led to static state and declining federal budget support in 2012. The end of federal sequester should allow Extension programs to hold steady into 2014. However, the continued growth in student enrollment has resulted in UNL adding 36 new positions in 2013, with approximately six having Extension responsibility, with more faculty position additions anticipated in 2014.

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

UNL Extension has five spires of excellence with two action teams specifically targeting global food security issues: 1) Beef Systems and 2) Crops for the Future. The Action Team supporting each spire has identified one or more "Signature Outcomes" that first became active at the start of 2010. These "Signature Outcomes" continue to be delivered statewide in 2014 and methodologies established for measuring statewide impact allowed capture of a significant part of our 2013impact (see "Making a Difference" at http://extension.unl.edu). The faculty team supporting each spire is in the process of implementing 2014 statewide delivery and evaluation procedures identified in the statewide action plans. These methods developed by our Action Teams provided our third statewide snapshots of educational program impacts including knowledge gain, intended and actual practice change, and likely conditional changes.

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. We are still in the process of determining the robustness of this dataset.

Key Items of Evaluation

Extension action team implementation plans, evaluation indicators and tools as well as 2013 Impact reports are all found at http://www.extension.unl.edu/web/Extension/progfocus. A review of the specifics of these implantation and evaluation plans are found for the two most relevant action teams by going to http://www.extension.unl.edu/web/Extension/progfocus/actionteam-beef and http://www.extension.unl.edu/progfocus/actionteam-crops-of-the-future

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Sustainable Energy

☑ 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
133	Pollution Prevention and Mitigation	0%		15%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		17%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		17%	
205	Plant Management Systems	30%		11%	
511	New and Improved Non-Food Products and Processes	70%		40%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	13.0	0.0	7.0	0.0
Actual Paid Professional	5.0	0.0	12.0	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**
144428	0	245555	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
91803	0	168492	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 research and extension programs to develop/deliver information on new or improved energy products and technologies and emerging efficiencies of production to Nebraska's ag-based industries.

2. Brief description of the target audience

Land owners, agricultural producers, youth, and graduate and undergraduate students.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	900	23000	2365	0

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

Patent Applications Submitted

Year: 2013

Actual: 1

Patents listed

Taurine prodcution in wild type algal strains and genetically modified Chlamydomonas reinhardtii

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	1	17	18

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Percentage of Agricultural Research Division HATCH projects in sustainable energy.

Year	Actual
2013	6

Output #2

Output Measure

- Number of workshops, continuing education programs, web-based curricula and field days/tours related to sustainable energy.

Year	Actual
2013	100

Output #3

Output Measure

- Number of new extension publications and other educational resources related to sustainable energy.

Year	Actual
2013	1

Output #4

Output Measure

- Number of new products and decision tools developed and made available to clientele related to sustainable energy.

Year	Actual
2013	3

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Nebraska will have access to higher educated workforce trained in the new biology with skills applied to addressing critical science in sustainable energy.
2	Extension will assist land owners involved in negotiating land use contracts with wind energy developers (measured by number of land owners participating in educational programs).

Outcome #1

1. Outcome Measures

Nebraska will have access to higher educated workforce trained in the new biology with skills applied to addressing critical science in sustainable energy.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

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

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
511	New and Improved Non-Food Products and Processes

Outcome #2

1. Outcome Measures

Extension will assist land owners involved in negotiating land use contracts with wind energy developers (measured by number of land owners participating in educational programs).

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	250

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Nebraska has 304 operational wind turbines with a total capacity of 534.18 megawatts (or 534,180 kilowatts for comparison purposes). The average annual output could power about 184,880 homes. In 2013, Nebraska ranked second in ethanol production capacity, 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. As of December 2013, Nebraska's operating production was 1.82 billion gallons per year, approximately the same level as this same time the previous year. Commercial biodiesel plants in Nebraska currently have the capacity to produce 5,400,000 gallons although both plants are no in operation.

What has been done
Bioenergy: Bioenergy Friday Web Seminars website and complimentary YouTube channel (Cropwatch Bioenergy) are maintained by UNL faculty. In addition, UNL is a cooperator with an Iowa State University led CenUSA grant (USDA NIFA AFRI) that engages farmers and crop consultants in developing an understanding of switchgrass production. Finally, a biofuel youth curriculum with a hands on experiment was piloted in 2013 with over 250 Nebraska youth. The experiment teaches youth about biofuel production and specifically sugar chemistry where youth test foods and fibers for the presence of sugars, starches, and cellulose.

Home and Farm Energy Production: UNL has received a grant from DOE to develop research and demonstration of solar and wind energy systems for smaller scale home and farm based energy production. As part of the grant six solar array products, two small wind turbines, and a center pivot powered by 98% ethanol using a specially designed engine are installed at a regional research farm in northeast Nebraska. Live Internet streaming of data is accessible at (http://cropwatch.unl.edu/web/bioenergy/sustainable-energy-options. New products created in

include Home Energy Efficiency Series (seven videos) produced in cooperation with the Nebraska Energy Office, Small Wind Turbine Raising and Construction videos, and a Nebguide on Economics of Solar PV Systems will help people understand the complexity electricity price inflation in their economics calculations.

Energy Literacy: Energy Literacy has become part of the science literacy lexicon. Starting in 2011 with the Wired for Wind curriculum, Nebraska youth have been introduced to engineering and science using wind turbines as our experiment. In 2013 Wired for Wind and other energy curriculum have been shared with 1,450 youth.

Results

Bioenergy: Bioenergy Friday Web Seminars 2013 Highlights include:
- Eight Web Seminars (130 live participants)
- 55% would use the information to teach others
- 23% would use the info for written communications such as newspaper articles
- 575 views of archived videos (of 2013 videos) and 2,500 views since 2011
- 17% from academia, 55% from Extension, 6% from biofuels or renewables industry, and 9% from government agencies.

UNL's bioenergy website had over 16,000 views in 2013 and the complimentary YouTube channel (Cropwatch Bioenergy) over 5,000 views. Through 2013 250 farmers and crops consultants have been engaged in educational programs about switchgrass and bioenergy crop production agronomics and future opportunities through the CenUSA Project. Additionally, a biofuel youth curriculum with a hands on experiment was piloted in 2013 with over 250 Nebraska youth.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
511	New and Improved Non-Food Products and Processes

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Natural disasters: Extreme drought conditions arrive in Nebraska during the spring of 2012 and persisted all year. Residual effects of this drought reoccurred in central and southern regions of in Nebraska into 2013. Most grasslands recovered but reduced grass productions was common in 2013. An early winter storm in northwest Nebraska caused the death of several thousand head of cattle.

Economy: As the 2013 fall harvest neared, prices declined compared to 2012's record-setting prices. Because of the high grain and forage costs through the first half of the year, livestock farmers experience continued high feed costs and losses until late in 2013. In addition, the decline in cow numbers, in part, from the 2012 drought resulted in fewer calves and yearlings for placement in feedlots and declining meat supplies. By the end of 2013, beef prices were setting record highs. In addition, the appearance of the PED virus in Nebraska swine herds as well as in many other swine producing regions, is producing smaller supply of pork and record pork prices by the end of 2013. As a result of declining crop prices, land value increased by only 5% in 2013 and land rental rates declined.

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. These ethanol plants represent more than $5 billion in capital investment in the state and provide direct employment for some 1,200 Nebraskans. As of December 2013, Nebraska's operating production was 1.82 billion gallons per year, approximately the same level as this same time the previous year. With the decline in corn prices, Nebraska plants are expected to return to production levels closer to full capacity. However, California restrictions, RFS policy debates in Washington, and limitations of ethanol sales resulting from E-10 mixes of ethanol and gasoline are currently restricting growth of ethanol production.

Public policy and Government Regulations: Lack of a five-year farm bill was the primary public policy discussion in 2013. Disappearance of all USDA safety nets for ranchers experiencing extreme drought and other weather related losses will prevent cow numbers from recovering anytime into the near future.

Appropriation Changes: Steady state tax collection and soaring federal deficits have led to static state and declining federal budget support in 2012. The end of federal sequester should allow Extension programs to hold steady into 2014. However, the continued growth in student enrollment has resulted in UNL adding 36 new positions in 2013, with approximately six having Extension responsibility, with more faculty position additions anticipated in 2014.

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

UNL Extension has five spires of excellence with four Extension faculty contributing to two action teams addressing energy related topics: 1) Water/Climate/Environment for Agriculture and 2) Water/Climate/Environment for Community. However, these Action Teams have not identified Energy related topics as Signature Outcomes for which statewide implementation of targeted. Our primary evaluation initiatives are focused on UNL Extension's Signature Outcomes. As such, only limited impact data is collected for Energy related UNL Extension programs.

Key Items of Evaluation

No evaluation plan exists for UNL Extension programs related to Energy.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Childhood Obesity

☑ 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
701	Nutrient Composition of Food	0%		8%	
702	Requirements and Function of Nutrients and Other Food Components	15%		47%	
703	Nutrition Education and Behavior	25%		10%	
724	Healthy Lifestyle	25%		9%	
802	Human Development and Family Well-Being	10%		26%	
806	Youth Development	25%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	22.0	0.0	11.0	0.0
Actual Paid Professional	60.0	0.0	2.0	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**
1182550	0	116328	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1468850	0	105343	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

The Institute of Agriculture and Natural Resources will conduct research and deliver extension education programs that will enable Nebraskans to increase their consumption of foods that match their specific MyPlate recommendations, creating healthier eating patterns and increasing physical activity levels. A variety of teaching strategies will be used for programs through one-on-one education, group settings, health fairs, on-line and distance programs, social media such as Pinterest, Facebook and Twitter, blogs, webpage development, mobile applications, media and use of eXtension programming.

In addition, long-term research strategies are aimed at 1) using genome-based technologies to develop individualized nutritional strategies that will impact chronic "lifestyle" diseases and obesity, 2) developing bioactive foods that provide health-promoting functionality when consumed and 3) understanding fundamental linkages between food components, the gut microbiome, and immunological responses that result in a particular nutritional status.

2. Brief description of the target audience

The target audience includes:
- High-risk families,
- Children,
- Families of young children (young children defined as those 0 - 8), and
- Adults interested in increasing their overall health.

3. How was eXtension used?

In 2012 (most recent time for which statistics are available), 23,000 visits to eXtension originated from Nebraska resulting in 67,000 eXtension Web page viewings. In addition, 325 Ask an Expert questions originated from Nebraska and 413 responses were supplied by UNL Extension faculty. We have 356 faculty and staff with eXtension IDs, 159 faculty represented as members of 49 of 73 CoPs and 18 who provide leadership for CoPs.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	15000	20000	37000	50000

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	5	10	15

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of extension in-depth workshops.

Year	Actual
2013	45

Output #2

Output Measure

- Percentage of Agricultural Research Division HATCH projects in childhood obesity, fundamental nutritional sciences, and family well-being.

Year	Actual
2013	5

Output #3

Output Measure

- Number of scholarly publications and curricula related to childhood obesity.

Year	Actual
2013	9

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Youth will consume foods that match their MyPyramid recommendations.
2	Youth will increase the number of minutes spent in daily physical activity to recommended levels.
3	Adults will apply behavior change strategies to increase weight loss
4	Nebraska will have access to higher educated workforce trained in the new biology with skills applied to addressing critical science in child obesity

Outcome #1

1. Outcome Measures

Youth will consume foods that match their MyPyramid recommendations.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	37000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Nebraska, over $498 million dollars are spent annually on obesity related health care. Obesity and physical inactivity are risk factors for heart disease and stroke, diabetes, and some cancers. In Nebraska, overweight and obesity affect 65% of adults and 33% of youth. The obesity issue translates into missed work, higher health care costs, and a negative impact on Nebraska's economy.

What has been done
In 2013, 3,164 youth were educated about MyPlate, portion sizes, eating fruits and vegetables, the importance of drinking milk, drinking less sugary drinks, and increasing physical activity. In addition to that one-on-one education, group settings, health fairs, on-line and distance programs, social media such as Pinterest, Facebook and Twitter, blogs, webpage development, mobile applications (apps), and media are tools also being used to share MyPlate recommendations to young people. Our USDA/NIFA/AFRI grants with multi-state partners are focused on childhood obesity prevention and food security. In 2013, food.unl.edu had ~1.6 million pageviews and document downloads. In addition, 4-H programs have the overall goal of increasing healthy behaviors.

iCook is a new program that is underway. The lessons are based from UNL Extension Curricula, 'Fast Foods' and 'Youth in Motion.' Each lesson includes culinary skill development, a specific nutrient focus, physical activities, family engagement and dinner time talking strategies.

Results
In 2013, 37,000 young people were reached with educational programs aimed at increasing the consumption of foods that match MyPlate guidelines by UNL Extension. Youth participants

increased their knowledge/awareness of and made healthier decisions regarding MyPlate and physical activity recommendations, which will contribute to lower medical costs for families and communities in the future. Example programs follow.

Eat 4-Health - This project, funded by United HealthCare, trained teen ambassadors to teach other youth and adults about the importance of making healthy food and activity choices. Throughout 2013, these teens taught over 4,500 younger youth about healthy living at over 20 different events in 10 targeted communities.

As part of UNL Extension's nutrition programming, Nebraska's Nutrition Education Program (NEP) offered school enrichment kits to 51 counties and reached 14,065 youth. Youth increased their knowledge of hand washing, identifying foods from food groups, reading food labels, and food safety. By training and providing Nutrition Kits for elementary school teachers, UNL Extension had 61,000 contacts with those young people. Nutrition Kits were promoted with this video: http://www.youtube.com/watch?v=pPAYm5nQ3uQ

In 2013 over 19,500 youth participated in SNAP-Ed. SNAP-Ed provides youth nutrition programs at a variety of community sites such as summer youth camps, schools, after-school sites, and teen residential treatment programs. Participants learn to: follow MyPlate guidelines, develop good nutrition habits, prepare healthy snacks, practice proper hand washing, and be physically active. One example of a success story follows:

A SNAP-Ed nutrition assistant taught a kindergarten class the first lesson of their "Eat Your Colors" lesson series. They talked about how they could eat "their colors" with all the colors of fruits and vegetables. The assistant challenged the students to look at their lunch trays, find the fruits and vegetables on them, and give each one a try if they hadn't tried it before. The next week when the assistant went back to the same kindergarten class, one of the students approached her and said, "I tried the broccoli and I liked it". The teacher later explained that the student had indeed, tried the broccoli for the first time.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #2

1. Outcome Measures

Youth will increase the number of minutes spent in daily physical activity to recommended levels.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	21000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
While making appropriate food choices is one part of the overall obesity issue, increasing physical activity is another part of that equation. Increased physical activity can lower risk for disease and illness which will eventually lead to lower long term medical costs for families and communities.

What has been done
Creating Balance with Food & Fitness is a program targeted toward adults that addresses: balancing calories to manage weight, knowing which foods and nutrients to increase and decrease, and increasing physical activity levels. The seven-week statewide program started in the spring, 2012 and continues to grow. The program developed by UNL Extension is offered live via webinar and archived on the eXtension website. Based on first-year results, the curriculum has been expanded to include 25 hours of programming and is available on the UNL Marketplace: http://marketplace.unl.edu/extension/extpubs/foods-nutrition/creatingbalance. In the first six months the curriculum has been available, six sets have been sold.

UNL Extension's Eating Smart from the Start, is a professional training program designed to empower providers to plan, prepare and serve healthy meals and create a healthy food environment for children. This 10 hour course gives childcare providers the tools to serve nutritious meals and teach healthy eating habits to the children in their care.

Results
Of those 21,000 youth who participated in nutrition education programs offered through UNL Extension's SNAP-Ed and EFNEP in 2013, 78% of youth reported that they are almost always physically active every day, and 76% percent reported knowing the amount of physical activity they need each day. Nebraska 4-H summer camps encourage and help youth campers stay active and physically fit with 88% of survey respondents agreeing with the statement, "I participated in a physical activity each day."

Program participants in Creating Balance with Food & Fitness have shown statistically significant improvements in physical activity levels; consumption of fruits, vegetables and whole grains; using Nutrition Facts Labels; setting specific food and fitness goals; and increased water consumption.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Adults will apply behavior change strategies to increase weight loss

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	700

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Nebraska, overweight and obesity affect 65% of adults. As stated previously, 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.

What has been done
In addition to the previously mentioned programs focused on increasing adherence of MyPlate guidelines and increasing physical activity, another program offered by UNL Extension designed to increase weight loss is Control Diabetes for Life. This educational program is broadcast to several locations throughout the state and recorded for later viewing. Participants learn to control diabetes while preparing nutritious and delicious foods that are low in sugar and fat. This six-hour program helps participants establish new goals for diabetes self- management, control blood sugar levels, and understand how physical activity contributes to the good health of a diabetic person with diabetes. Control Diabetes for Life has reached 4,500 people in its nine year history, provides a way to reach low income people diagnosed with diabetes, and is offered free of charge in coordination with Nebraska Department of Health and Human Services and University of Nebraska-Lincoln Extension.

The Childcare and Youth Training & Technical Assistance Project (CYTTAP), funded by NIFA in collaboration with the Department of Defense, works to improve the quality and quantity of child care in states with high densities of off-installation military families. From November 2011 through October 2013, child care providers and early childhood education professionals attended face-to-face trainings, train-the-trainer events, and low- or no- cost online trainings. All the trainings hours are accepted for Child Development Associate (CDA) formal education hours. In addition, most of the participating states credit the trainings towards state-approved professional development hours required to maintain licensing/certification or quality improvement ratings. Train the trainer events contributed to the sustainability of CYTTAP project goals. These events produced a cadre of state trainers who are prepared to deliver ongoing professional development training throughout the state to direct care providers.

Results

As a result of the "Control Diabetes for Life" program, participants reported statistically significant changes in: selecting and modifying new recipes to help families develop tastes for healthier foods and how to modify components in casseroles; developing techniques to use when cooking with sugar substitutes; understanding complications due to low levels of Vitamin D; understanding that being diagnosed with diabetes can increase the likelihood of experiencing winter time blues and/or depression and ability to identify causes of seasonal "blue" mood. Results of a one-year follow-up survey showed that program participants had significantly either improved of greatly improved in the following areas: exercising (58%), using diabetes appropriate foods on special occasions (71.7%), avoiding nighttime lows in blood sugar (61.3%).

The Control Diabetes statewide program aired on NET2 with over 36,000 views, 3,215 hits posted on the Web and 28 groups via distance education/DVD helped 504 people control blood glucose levels. Nebraska's Department of Health and Human Services calculates the value of diabetes education as saving $900/person/year equating an estimated savings of $450,000.

Providers that attended I Am Moving I Am Learning (IMIL) face-to-face trainings about preventing childhood obesity left with new strategies to implement in their work. Seven train-the-trainer events were attended by 163 people; 63 direct care provider trainings were attended by 819 people and 446 survey responses were received. Significant changes ($p<0.01$) occurred between retrospective pre- and post- training survey responses regarding:
* Health benefits associated with daily moderate to vigorous physical activity (MVPA)
* The impact of good nutrition on child development
* Discussing strategies with parents to support MVPA with children at home
* Building in movement activities with children that achieve 60 minutes of MVPA per day
* Implementing strategies for improving nutritional choices among parents and children

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
703	Nutrition Education and Behavior
724	Healthy Lifestyle
802	Human Development and Family Well-Being

Outcome #4

1. Outcome Measures

Nebraska will have access to higher educated workforce trained in the new biology with skills applied to addressing critical science in child obesity

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research shows that investments in early childhood yield long-term gains. Research and programming supporting young children empower caregivers and families to implement strategies that lead to a more safe, healthy, thriving environment for the child(ren) in their care. This benefits the community when children ready and prepared for school and a stronger future workforce. By investing in the education and care of our youngest citizens, we invest in the vitality, success and future well-being of the entire community.

What has been done
In 2013, UNL's Institute of Agriculture and Natural Resources (IANR) hired 36 new tenure-leading positions to focus on areas of highest need. One of those areas, Healthy Humans, intertwines the research, teaching, and extension programming necessary to better understand human behavior and health as well as make strides toward reducing childhood obesity. As part of this hire, are three new faculty. Their expertise areas include: Behavioral Based Epidemiology, Behavioral Economics and Health Disparities, and Childhood Health Behaviors. This team of new faculty, combined with existing expertise, positions IANR to make major research contributions to the field, educate the future workforce who will be employed in health/nutrition careers, and make long-term changes in eating habits which could impact childhood obesity.

UNL Extension has hired a new specialist focusing on early childhood to expand the work of our Learning Child Team. This team is committed to enhancing the capacity of communities to support the healthy growth, development and success of young children, which in turn, contributes to a stronger workforce in the future.

In order to best prepare young people for the future workforce, the University of Nebraska offers 29 undergraduate programs of study and two pre-professional programs in agriculture and natural

resources, and 15 Master of Science and 13 Ph.D. programs. Our programs include agribusiness, animal science, agronomy, biochemistry, biological systems engineering, fisheries and wildlife, food science and technology, pre-veterinary medicine, professional golf management, etc.

Results

While it is premature to assess the impact of the Healthy Humans initiative and the work of the new faculty, other results can be documented. Examples follow.

More than 6700 early childhood professionals and families engaged in at least twp hours of Learning Child programming in 2013. These adults now have more knowledge, skills, and tools to support the healthy growth and development of the more than 30,600 Nebraska children in their care.

In efforts to curb childhood obesity, over 100 childcare providers have participated in the Eating Smart from the Start program in the past two years. Of those who participated:
* 50% of childcare providers are purchasing and serving more fruits and vegetables
* 75% of childcare providers are now using appropriate sanitation methods to prevent cross-contamination

Nebraska 4-H reaches one out of three of those who are age-eligible and is helping youth focus on their future success and preparing youth to make informed decisions about their college and career paths. Of those who participated in 4-H in 2013:
* 55% reported an interest in attending the University of Nebraska-Lincoln in the future
* 90% said they know how to find information about educational option they are interested in; an increase of 40% from before the program
* 92% of students reported that they can see career opportunities in Nebraska
* 93% recognized the value of their communities as their future network

In 2013, there were 451 Baccalaureate and 158 Masters/Doctoral degrees conferred at the University of Nebraska in agricultural and natural resources related areas. Over 85% of our Baccalaureate degree graduates find jobs in their fields or continue with their professional education; approximately 70% take their first job in Nebraska. In addition, within the College of Education and Human Sciences, the Department of Nutrition and Health Sciences graduated 151 BS-level Nutrition and Dietetics students with expertise to address obesity issues.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
724	Healthy Lifestyle
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

Brief Explanation

Nebraska's support of higher education and UNL Extension allowed us to meet our goals as planned. UNL 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 childhood obesity.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

UNL 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 2012, 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/

Key Items of Evaluation

UNL 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 2012, 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.

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V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Food Safety

☑ 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
501	New and Improved Food Processing Technologies	30%		15%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	30%		8%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	30%		77%	
806	Youth Development	10%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	27.0	0.0	13.0	0.0
Actual Paid Professional	16.0	0.0	9.0	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**
453089	0	310287	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
321311	0	261151	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

IANR will us a holistic approach in addressing food safety from farm to fork. Research and extension programming will target reducing food borne illnesses. A variety of teaching strategies will be used for program delivery including face-to-face education, distance learning technologies, and eXtension programming.

2. Brief description of the target audience

The target audience for this program includes:
- Producers,
- Food processing and retail establishment owners/workers, and
- Consumers.

3. How was eXtension used?

Food Safety programming continues to benefit from eXtension resources. In addition to serving as a reference for new topics, eXtension content is regularly linked back to our umbrella food website (http://food.unl.edu) which houses our food safety resources. UNL Extension faculty are regular contributors to the eXtension site in the food/nutrition and food safety areas.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	15000	3600	37000	22000

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

Patent Applications Submitted

Year: 2013

Actual: 3

Patents listed
Probiotic to prevent Candida yeast infection

In-Shell Pasteurization of Eggs

Probiotics and methods of obtaining same

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	5	7	12

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of extension in-depth workshops.

Year	Actual
2013	37

Output #2

Output Measure

- Percentage of Agricultural Research Division HATCH projects in food safety.

Year	Actual
2013	4

Output #3

Output Measure

- Number of scholarly publications and curricula related to food safety.

Year	Actual
2013	10

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increased adoption of pre-harvest methods for beef quality and safety.
2	Increased implementation of safe food handling practices by food service providers and consumers.
3	Nebraska will have access to higher educated workforce trained in the new biology with skills applied to addressing critical science in food safety.

Outcome #1

1. Outcome Measures

Increased adoption of pre-harvest methods for beef quality and safety.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	3620

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, $7.1 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 1.71 million beef cows in Nebraska, ranking us fourth 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
Educational programs for meat and food processing establishments helped implement food safety controls and new technologies to reduce food borne hazards include:
* Four "Implementing Your Company's HACCP Plan" workshops provided company employees with the tools to implement and manage HACCP in their facilities to meet USDA regulations and reduce the risk of food borne hazards.
* Assistance to one very small meat processing businesses with establishment of the grant of inspection and approximately 20 very small meat processing businesses with HACCP plans, food safety plans, and responses to regulatory non-compliance.
* Assembly of photographs and background information for standard operating procedures in veal slaughter targeted at reducing the incidence of STEC (Shiga Toxin E. Coli)
* Improved understanding of livestock producers and meat processors on quality, consistency, and value of market animals and processed meat products.
* Demonstrations on three carcass boxed beef cut-outs to show the effect of grade on value.
* Carcass contests for the Nebraska State Fair and the Ak-Sar-Ben Livestock Expo.
* Workshop on processed meats for the Nebraska Association of Meat Processors on ingredients

and processing technologies to improve quality and economic sustainability of processed of their meat products.
* A Cured Meats Contest for the Nebraska Association of Meat Processors.
* Five Food Processing Center projects for clients introducing a new product or ingredient.
* Published Powerpoint presentations with instruction for identification of retail meat cuts used in the CDE contest for instructors and conducted the CDE (Career Development Events) and PASE (Premier Animal Science Events) Meat Evaluation contests for youth.
* Increase the knowledge and awareness on meat science and food safety topics of undergraduate and graduate students.

The 4-H Livestock Quality Assurance (LQA) Online Program teaches youth about the quality of meat and food products that come from livestock. Quality assurance for livestock producers means making a promise to the consumers, or the people who consume the meat, milk and dairy products, and eggs that come from livestock poultry. The promise made is that products from livestock will be the highest possible quality and producers will do everything possible to make these products safe to eat. All Nebraska 4-H youth ages 8-18, who are enrolled in a livestock project (beef, dairy cattle, dairy goat, meat goat, poultry, rabbit, sheep, and swine) are required to complete three modules in the LQA Online Course in order to get certified. Certificates of completion are then turned into their local Extension office in order to receive full credit for completion allowing youth to participate in local, state and regional livestock competitions.

Results

Increased knowledge and awareness of the livestock and meat processing industry for quality, consistency and value differences in market animal carcasses and processed meat products:
* Beef carcass cutout value and the influence of quality and yield grade were demonstrated to two groups. We provided presentations on beef grading, cuts of beef and beef carcass cutout, ground beef formulation, beef in processed meats, and beef food safety for the programs. Industry representatives and beef producers were provided with an opportunity to increase their knowledge and awareness of factors affecting beef quality, the impact of USDA grades and carcass muscling on carcass value, and food safety.
* Held carcass contests for the Nebraska State Fair and the Ak-Sar-Ben Livestock Show involving over 450 exhibitors; Meat Evaluation and Identification contests for 4-H PASE and the Nebraska Career Development Events (CDE); workshops 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.
* Helped to improve processed meat quality and profitability of small and very small meat processing business. Evaluated processed meat products for the Nebraska Cured Meats Competition. Evaluations were conducted on over 250 processed meat products. Association members were able to utilize the product ideas and meat processing techniques to improve the variety and quality of products they sell in their business

In 2013, 3,418 youth participated in the 4-H Livestock Quality Assurance (LQA) online course reaching youth in 80% of Nebraska counties, with 7,972 module certificates earned (youth are required to complete at least three for LQA certification each year). Certificates are issued only when a youth has achieved an 80% competency on the module content. Youth have access to the course from a variety of locations (home, extension office, library, etc.) including one youth able to complete LQA requirements on the bus using a smartphone in route to a basketball game. The following statements are preliminary findings from the ongoing research on this course

(n=358):
* 88% of participants understand that as a food producer, they have a responsibility to consumers for quality assurance.
* 83% of participants learned how to care for their animal in a way that preserves carcass quality.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
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
806	Youth Development

Outcome #2

1. Outcome Measures

Increased implementation of safe food handling practices by food service providers and consumers.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
About 48 million people (one in six Americans) get sick, 128,000 are hospitalized, and 3,000 die each year from foodborne diseases, according to recent data from the Centers for Disease Control and Prevention (CDC). The Food Safety Modernization Act (FSMA), signed into law by President Obama on January 4, 2011, when fully implemented will shift the focus of food safety for federal regulators from responding to contamination issues, to preventing them.

What has been done
UNL Extension continues to be the "go to" organization for food safety education for the meat processing industry, food service providers, and consumers. For example, UNL Extension

reached 139 small and very small sized meat processing operations in Nebraska, Kansas, Missouri, and South Dakota with education on Hazard Analysis and Critical Control Point (HACCP) information.

During 2013, our USDA Food Safety for Diverse Families team developed an educational program based on research data collected from focus groups and surveys. The educational program was developed to be culturally sensitive for Native American and Hispanic families with young children. The Conceptual Change Teaching Strategies was used in the development of the educational program which is a participant-centered teaching methodology to increase behavior change. This teaching methodology was used based on the desired learning method of the participants from the focus groups (ie; teaching methodology was matched to learning style of the participant). Four graduate students were trained to deliver the program; six sessions were conducted with Native American audiences (n=40) and four sessions with Hispanic audiences (n=45).

The incidence of chronic and episodic conditions related to improper food handling will decrease which brings to a major food safety focus in 2013, promoting (through social media) food safety materials/messages for the public. There are 3,000+ food-safety related deaths yearly. This Internet-based outreach helps get materials directly into consumer hands and to other multiplier groups "Any Time, Any Place Any Path, Any Pace." Several statistics indicate this by helping provide materials that meet consumer and health professional needs. The most outstanding examples include:

HANDWASHING MATERIALS
Some scientists estimate up to 80% of all infections are transmitted by hands, according to the Centers for Disease Control and Prevention (CDC). CDC considers handwashing the single important thing you can do to help prevent the spread of infection and to stay healthy and well. Handwashing posters developed over seven years ago with our local health department and that continue to be promoted through social media still meet a vital need.

The ServSafe Program delivers consistent food safety training to employees. The program covers: food safety, hygiene, cross-contamination, allergens, time and temperature, cleaning, and sanitation. UNL Extension Educators and specialists work the Nebraska Restaurant Association in providing training. This year ServSafe Starter training was conducted for the National Guard. Usually this training is for those employees or youth working in foodservice in the summer or as a part-time job.

Results
The research components of the new USDA grant, "Food Safety for Diverse Families (Native American and Hispanic) results show a 39.6% (p=0.0001) increase in knowledge was found for the Hispanic participants from the pre-post surveys and a 21% (p=0.037) increase in knowledge for Native American. Since we are working with diverse populations, more work is needed to establish relationships with key people within the cultural populations. In November, a graduate student and specialist went to the University of New Mexico (UNM) to provide training for their team.

As a result of HACCP education 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 completing the course and they indicated they would be more willing to discuss HACCP plans with co-workers.

In 2013, assistance was given to 21 small meat processing businesses for HACCP plan development, reassessment, and implementation of food safety procedures including standard operating procedures for E. coli O157:H7 sampling to small processors. Assistance was also provided to one company with establishing the USDA grant of inspection and for startup advice to two additional companies.

Handwashing statistics for 2013 indicate:
* A Google search for "free handwashing posters" brings them up first in the world.
* 53,213 pageviews/33,521 unique views for food.unl.edu webpages offering downloadable handwashing posters.
* 287,510 downloads of PDF handwashing posters, handouts, etc. have occurred since original placement on the Web. (PDF files aren't counted in Google Analytics statistics and are hand tallied.)

In 2013, UNL Extension trained 797 managers on ServSafe. These managers trained nearly 10,000 front-line staff and 430 ServSafe Starters. From the pre/post evaluation data collected across the state for ServSafe, we have significant increases in knowledge gain in eight of the 10 questions that we ask. For ServSafe Starters, increases in self-reported knowledge indicated:
* 57% calibrate a thermometer
* 44% proper cooling methods
* 35% minimum cooking temperatures

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
806	Youth Development

Outcome #3

1. Outcome Measures

Nebraska will have access to higher educated workforce trained in the new biology with skills applied to addressing critical science in food safety.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Preparing Nebraska's youth to pursue meaningful career choices, especially in the areas of science and the new biology continues to be a top priority of Nebraska 4-H. The 2012-2017 Nebraska 4-H Strategic Plan sought to teach our youth the value of opportunity and connectivity, and to develop the skills necessary for acting on those opportunities. Through various 4-H programs, projects, and activities, youth were able to discover and pursue their interests as they relate to future career possibilities. In each of these endeavors, a special emphasis was placed on careers related to science. It is anticipated that this focus will help generate a new pool of science-ready students who can take on the challenge of feeding 9 billion people. Food safety plays a critical role in meeting that challenge.

What has been done
As a part of their experience, each Nebraska 4-H participant is challenged to engage in projects that are of interest to them and match their skills. 4-Her's are then empowered to connect the dots between that set of skills and potential careers. The new Career Explorer app released in 2011 has been downloaded 7,627 with total game plays that reached the final page totaling 22,285. Top 10 careers chosen through the Career Explorer app in order were: lawyer, veterinarian, singer, actor, surgeon, pediatrician, animal breeder, architect, teacher and fashion designer.

Results
While not all directly related to food safety, the work of Nebraska 4-H in helping young people be college-ready and prepared to choose careers that would benefit the state are obvious. Over the last five years, the efforts of Nebraska 4-H have been evidenced by the significant increase in percentage of youth respondents who know a college major related to their 4-H program or project. After participating in a 4-H program, 83% said they interacted with someone working in a career area they're interested in; an increase of 55% from before the program; 97% of students agreed that they now understand the value of higher education in their future; 84% agreed that they understand the path to their desired career, an increase of 21% from 2011.

Nebraska 4-H is developing science interests, skills and abilities in the areas of agriculture, energy, environmental stewardship, and food science and technology. When surveyed, 88% of 4-Her's agreed or strongly agreed that they can explain their science-related decisions to others; 89% agreed or strongly agreed that science is important in solving everyday problems and 99% agreed or strongly agreed that good scientists work together to solve problems.

In 2013 the Departments of Food Science and Technology and the Department of Nutrition and Health Sciences confired 31 graduate degrees on students with expertise in Food Safety.

4. Associated Knowledge Areas

KA Code	Knowledge Area

501	New and Improved Food Processing Technologies
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
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

UNL Extension has been able to successfully meet goals as planned in the area of food safety. 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

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

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. We are still in the process of determining the robustness of this dataset.

Key Items of Evaluation

UNL 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 2012, 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.

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