

# 2011 University of Nebraska Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 07/03/2012

## 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 the IANR and the residents of the state. Within the past year 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 the 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 build 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, involved faculty/administrative leaders in discussions with representatives of civic and community organizations and the agricultural industry; resulted in focus group discussions about specific topics such as the future of rural communities, and led to 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. The next step is for administrative units of IANR to write their long term goals to support these priorities of food, fuel, water, landscapes and people.

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 food to fork which includes 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 wellbeing 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 integration of 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 careers.

**Total Actual Amount of professional FTEs/SYs for this State**

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	186.0	0.0	183.0	0.0
Actual	221.0	0.0	180.0	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 2011 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 for each of the Extension action plans (Animal Agriculture, Crops for the Future, Child and Youth, Food-Nutrition-Health, Water and Environment). Entrepreneurship cross cuts these program areas. These 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 in 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, dieticians, staff of the Department of Agriculture and the 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. Internally funded competitive grant projects were reviewed by both internal and external peers before being selected. 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 appointment hence the research and the extension content areas in which they work are aligned and their work between research and extension becomes more seamless.

Five subject matter departments and one research and extension center completed their five year reviews in 2011. Teams comprised of external panel members and faculty members from within the University of Nebraska-Lincoln reviewed the self-study documents, interviewed and asked questions of

faculty, administrators and recipient stakeholders of the units. The goal being to help insure that direction of the units is future focused and programs are relevant and of 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 extension.unl.edu](http://extension.unl.edu) and scroll to the bottom left hand side of the homepage to see **MAKING a DIFFERENCE.**) Impact reports are printed annually for each action plan (and some related areas) and 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. These 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. The addition of a staff member by Extension in 2010 to identify and encourage private/public partner engagement in developing educational endeavors 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. Specific 'listening' sessions with traditional and non-traditional groups included thirty-nine meetings by Vice President and Harlan Vice Chancellor Ronnie Green and other IANR administrators. 4-H continued its efforts to survey both youth and adults to identify the high priority needs for programming.

Extension is a partner with the 1994 land grant institutions in our state. Extension and the Nebraska Indian Community College (NICC) have had an eight year partnership to support the implementation and management of Tribal College Extension programs in 3 different NICC communities. IANR Extension faculty who work routinely with the Tribal colleges serve as a conduit moving content and planning information between these entities.

The Panhandle of the state has both shortterm and long Hispanic residents. An Extension Educator in the Scottsbluff area works with audiences and local planning groups to insure 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 wanting 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.

**3. A statement of how the input will be considered**

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

**Brief explanation.**

Input from stakeholders is used in identifying emerging issues for both research and extension and in helping set priorities. Stakeholders are also invited for input when the selection of an administrator is required. For example, stakeholders are invited by personal invitation and media releases to participate in receptions and seminars as individuals 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 the Institute of Agriculture and Natural Resources 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 and is of value to Nebraska's residents and economy. Stakeholders recognize that priorities for programming must be established.

**IV. Expenditure Summary**

<b>1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)</b>			
<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
4930698	0	4239203	0

<b>2. Totaled Actual dollars from Planned Programs Inputs</b>				
<b>Extension</b>			<b>Research</b>	
	<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
<b>Actual Formula</b>	4456388	0	3643548	0
<b>Actual Matching</b>	5093401	0	4327482	0
<b>Actual All Other</b>	0	0	0	0
<b>Total Actual Expended</b>	9549789	0	7971030	0

<b>3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous</b>				
<b>Carryover</b>	1408197	0	824738	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

**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%		3%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		10%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	2%		8%	
205	Plant Management Systems	28%		7%	
206	Basic Plant Biology	0%		6%	
211	Insects, Mites, and Other Arthropods Affecting Plants	4%		8%	
212	Pathogens and Nematodes Affecting Plants	4%		12%	
213	Weeds Affecting Plants	4%		7%	
215	Biological Control of Pests Affecting Plants	0%		1%	
216	Integrated Pest Management Systems	4%		5%	
301	Reproductive Performance of Animals	1%		7%	
302	Nutrient Utilization in Animals	4%		8%	
303	Genetic Improvement of Animals	1%		1%	
305	Animal Physiological Processes	1%		6%	
307	Animal Management Systems	20%		5%	
402	Engineering Systems and Equipment	1%		3%	
601	Economics of Agricultural Production and Farm Management	6%		1%	
806	Youth Development	10%		2%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	65.0	0.0	73.0	0.0

Actual Paid Professional	110.0	0.0	111.0	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
2285290	0	2257221	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
2555095	0	2882795	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.
- 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 will include land managers, bankers, agricultural consultants and agribusiness professionals who provide products and services to farmers and ranchers. The program's research and education efforts will provide valuable information for state and local policy makers (especially Natural Resource District Boards of Directors) as they make decisions regarding natural resources 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 2011, 21,000 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 523 responses were supplied by UNL Extension faculty. We have 147 faculty and staff that are members of 45 of 59 CoPs and 17 who provide leadership for CoPs.



**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	73000	145000	40300	80600

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

**Patent Applications Submitted**

Year: 2011

Actual: 1

**Patents listed**

United States Patent Application 20110268691  
(dsRNA Delivery Composition and Methods of Use )

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2011	Extension	Research	Total
<b>Actual</b>	25	223	248

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

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

Year	Actual
2011	109

**Output #2**

**Output Measure**

- Number of workshops, continuing education programs, web-based curricula and field days/tours related to global food security and hunger.  
Not reporting on this Output for this Annual Report

**Output #3**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2011	91

**Output #4**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2011	10

**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**

<b>Year</b>	<b>Actual</b>
2011	179000000

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

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

#### **What has been done**

UNL Extension's Beef Systems program focuses on 1) improving the competitiveness profitability, 2) adoption animal care practices that improve health, well-being, and quality, 3) improving business and management skills, 4) increasing consumer education about beef systems. Example programs include ranching practicums that deliver in-depth educational programming, ranching for profitability and other locally delivered educational programs, Feedlot Roundtables for manager and consultant and Feedlot Schools for employees, Husker Ag SMARTS for business planning, Beef systems home study courses emphasizing nutrition and health, satellite delivery of the latest research through Beef Satellite Short Course, nationally recognized web delivery (<http://beef.unl.edu> and <http://www.extension.org/beef+cattle>).

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 include growing network of Extension led on-farm research cooperators as well as regional workshops targeting No-Till, Soybean production (field day and on-farm research combined), and Crop Production Clinics. Statewide workshops address Crop Management and Diagonotic Field Training for consultants and Agricultural Technologies Conference and Trade Show.

## Results

In 2011, our Beef Systems team led ninety programs totaling over 460 contact hours that were evaluated. Fifteen-hundred and eighty-five producers and other agribusiness specialists representing 4.1 million head of livestock and 3.6 million acres attended one or more of these programs. Over 900 participants responded about the impact of attending one of these programs. Respondents estimated an average value in profitability of \$11.50 per head.

Examples of accomplishments by our Cropping Systems team include:

- \* The 414 participants in the Nebraska No Till Conference indicated that previous years' participation had contributed to total number of acres of no-till increased by 253,000 acres that saved or made an additional \$15/A or \$3.9 million.
- \* Crop Management and Diagnostic Clinic 2011 reached 310 participants producing a producer estimated value of \$7.53 per acre bringing the estimated total value of the program to over \$68 million.
- \* Crop Production Clinics reached 1626 participants representing 21 million acres of crop land resulting in 977 individuals recertified as pesticide applicators and changes in practice having an estimated value of \$17.5 to \$32 million.
- \* Soybean Management Field Days reached 478 participants that directly farmed 404,000 acres and influenced decisions on another 2.76 million acres. Participants valued the information from this workshop at \$25.4 million

The web is an increasingly important part of our educational program delivery. Our CropWatch web site had 192,653 visits with 455,432 pageviews. Since March 2010 when on-farm research was added to the web site, over half a million downloads of on-farm research studies have occurred.

## 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**

<b>Year</b>	<b>Actual</b>
2011	75

### **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. Our UNL Extensions five spires of excellence targets 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**

We estimate that in 2011, Extension faculty hosted educational workshops that produced about 39,000 learner-hours of education in Beef Systems and 34,000 learner-hours in cropping systems.

The web is an increasingly important part of our educational program delivery. UNL Extension has created 6 umbrella websites for combining content from many faculty under a common theme. Our CropWatch web site had 192,653 visits with 455,432 pageviews. Since March 2010 when on-farm research was added to the web site, over half a million downloads of on-farm research studies have occurred. Our Extension Beef web site was accessed by 385,530 visitors in 2011 who viewed 2,994,539 pages.

#### **Results**

Our Beef Systems team surveyed over 900 participants about the impact of attending one or more Extension programs. 93% of participants indicated moderate to significant knowledge gained in one or more subject matter areas and 50% indicated plans to improve or enhance

current practices in one or more subject matter areas. Examples of behavior change for participants that attended workshops on specific topics include: 50% are making business management changes, 47% are making health/handling/care changes, 66% are making estate planning changes, 60% are making ethanol co-product use changes, 61% are making marketing changes, and 57% are making reproductive management changes.

Examples of changes resulting from Cropping Systems education include: 414 participants in the three Nebraska No-Till Conferences indicated plans to implement practices that improve soil biological health (68%), improve water and nitrogen use efficiency (51%) and apply cover crop after harvest (34%).

Four Soybean Cyst Nematode (SCN) field days produced significant improvements in knowledge of SCN identification, biology, and management. 96% planned to test their soils for SCN presence.

The 478 participants at the 4 Soybean Management Field Days indicated expected changes in behavior relative to nitrogen management (53%), disease management (54%), efficiency of herbicide application (51%), and eliminating un-needed irrigation events (41%).

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
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**

<b>Year</b>	<b>Actual</b>
2011	14143

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

The 2010 Nebraska Groundwater Quality Monitoring Report focuses on nitrate and atrazine only, the only two agricultural compounds demonstrating more than a 2% of samples exceeding instrument reporting limits. The report states "since the 2005 report the number of analyses for nitrate greater than 10 mg/l has decreased" and data from 1994 to 2009 "statewide concentration of nitrogen and indicates a slight upward trend." It further states that "There is not enough recent data for atrazine, alachlor, metolachlor, or simazine to conduct any trend analyses." The 2010 Water Quality Integrated Report suggest trends for Atrazine and Ammonia in surface water as decreasing for 8 and 4 streams, respectively, increasing for 4 and 6 streams, respectively, and stable for 14 and 16 streams, respectively.

##### **What has been done**

The 2011 Commercial/Noncommercial Pesticide Safety Education Program currently licenses over 8,500 people as commercial and noncommercial pesticide applicators in Nebraska with 3,322 pesticide applicators trained in 2011. The 2011 Private Pesticide Safety Education Program trained an additional 10,821 participants with a total of more than 21,000 private applicators certified in Nebraska.

Additional educational programs were conducted on water quality issues relative to urban storm water management including best practices such as green infrastructure and rain garden design and installation (150+ participants), no-till crop production conferences (414 participants), onsite wastewater professionals training and certification (348 participants), small animal feeding operations use of vegetative treatment systems for open lot runoff (100 participants).



In 2011, UNL Extension deployed iPads and mobile internet service to all Extension Educators in Nebraska. About 6 new Apps were developed by UNL Extension including the Aphid Speed Scout App.

### **Results**

Participants in the 2011 Commercial/Noncommercial Pesticide Safety Education Program learned new or reinforced existing knowledge relative to pesticides laws and regulations (96%), pesticide application recordkeeping requirements (94%), health effects from exposure to pesticides (93%), protecting endangered species (93%), varying PPE requirements between applicators and handlers (92%), and the Worker Protection Standard (92%). Participants in the 2011 Private Pesticide Safety Education Program learned new or reinforced existing knowledge relative to use of Guide for Weed Management in Nebraska (94%), health effects from exposure to pesticides (93%), the Worker Protection Standard (92%), use of fumigation management plan (92%), pesticide application recordkeeping requirements (91%), use of Integrated Pest Management (IPM) strategies (91%), and value of Personal Protective Equipment (PPE) to protect one's health (91%). A follow up survey of 2000 individuals receiving IPM training suggested the following knowledge or behavior changes: a) 65% plan to always use multiple IPM approaches to manage pests, b) 45% increased knowledge of stink bugs and soybean aphids, c) 38% increased knowledge of managing herbicide resistant weeds, d) 69% will make improvements in soybean cyst nematode management, e) 73% will expand, modify, or start to use a diversity of tools for weed management, and f) 69% were likely or very likely to use IPM practices for specific insects.

According to the Senior Editor for the CropLife, Cotton and International Media Groups at Meister Media Worldwide, UNL Extension iPad App, Aphid Speed Scout is the number 1 Best Mobile App for Agriculture.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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
2011	520

### 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 (121 workshop participants), livestock environmental management issues (11 one-hour workshops delivered to a national audience of consultants, advisors, and agency staff), Beef Ranch Practicum for cattle producers using curriculum derived from the systems based research of the University of Nebraska through (8 day course with 4 hours of undergraduate credit), and the Nebraska Agricultural Technologies Conference which engages farmers and agribusiness in emerging GPS related technologies, site specific management and on-farm research.

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

#### Results

Extension: DNA Technology workshops produced improved informed selection decisions (100% of participants), more effectively use genomic tools (97%), increased knowledge of current application of genomics (92%). Livestock and Poultry Environmental Learning Center workshops engaged 1500 people and resulted new knowledge which contributed to improvements in water quality management (93% of participants), regulatory compliance (89%), value gained from manure utilization (88%), and air quality management (77%).

In 2011, there were over 360 Baccalaureate and over 160 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

<b>KA Code</b>	<b>Knowledge Area</b>
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: Normal precipitation patterns conditions persisted through most of Nebraska in 2011 leading to normal irrigation water use, good recharge of aquifers, and steady or rising water tables in most of Nebraska. Abnormal upstream snow and rainfall events during the spring of 2011 produced record flooding levels in the Missouri river valley that persisted for more than two months causing extensive property, infrastructure, and cropland destruction. Extension invested extensive educational resources in helping homeowners and crop producers deal with this flooding over a six month period.

**Economy:** 2011 was a year of record setting crop prices for crops and overall farm income levels. Growth in foreign trade has also produced demand for livestock products to record levels although high feed grain costs has limited livestock producer incomes. Land values increased by an average of 31% in Nebraska in 2011. While farm incomes are generally at unprecedented levels, high farm input costs and land prices have created unprecedented risks in farming and need for risk management education. But overall, the farm economy is stronger than has been seen since the mid-1970s.

The continued strength of the corn-based ethanol industry and a growing wind energy industry has brought significant benefit to many rural areas. We remain at 24 active ethanol production plants in Nebraska, with a combined production capacity of over 2 billion gallons of ethanol each year--and requiring 769 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. Loss of federal blending credits and implementation of California standards for biofuels is creating some angst over future growth or maintenance of Nebraska's biofuels industry.

**Public policy and Government Regulations:** Public pressure by the Human Society of the US continues to cause significant concerns among all agricultural organizations. HSUS continues to maintain an active presence in Nebraska.

**Appropriation Changes:** Steady state tax collection and soaring federal deficits has led to static state and declining federal budget support in 2011 with significant federal reductions possible in 2012. Elimination of some research and extension program areas is anticipated.

**Competing public priorities:** A customer base that has little connection and no understanding of modern agricultural production systems and a desire to use public policy to design agricultural systems continues as a major frustration among the agricultural community. Some aspects of this public oversight of food production is seen as beneficial such as local foods production and organic systems because of potential for premium prices. However, the lack of acceptance by some groups of many production technologies for reducing inputs ( e.g. 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 meddling by their customers and policy makers that the agricultural community believes to be poorly informed.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

UNL Extension has divided into 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 2011 and establish methodologies for measuring statewide impact allowed capture of a significant part of our 2011 impact (see Making a Difference at <http://extension.unl.edu>). The faculty team supporting each spire is in the process of planning 2012 statewide delivery and evaluation procedures identified in the

statewide action plans. These teams are also learning about the issues surrounding the Challenge of Feeding 9 Billion People and the implications of this issues for future Extension Signature Outcomes. These methods developed by our Action Teams provided our second 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 their dataset.

### **Key Items of Evaluation**

Extension action team implementation plans, evaluation indicators and tools as well as 2011 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-beefand> and <http://www.extension.unl.edu/progfocus/actionteam-crops-of-the-future>.

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

**V(A). Planned Program (Summary)**

**Program # 2**

**1. Name of the Planned Program**

Climate Change

**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%		15%	
111	Conservation and Efficient Use of Water	14%		18%	
132	Weather and Climate	4%		6%	
133	Pollution Prevention and Mitigation	5%		10%	
135	Aquatic and Terrestrial Wildlife	5%		4%	
141	Air Resource Protection and Management	4%		0%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		10%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	7%		8%	
302	Nutrient Utilization in Animals	4%		8%	
303	Genetic Improvement of Animals	0%		1%	
305	Animal Physiological Processes	0%		6%	
307	Animal Management Systems	4%		5%	
315	Animal Welfare/Well-Being and Protection	0%		1%	
403	Waste Disposal, Recycling, and Reuse	4%		2%	
405	Drainage and Irrigation Systems and Facilities	14%		1%	
605	Natural Resource and Environmental Economics	10%		5%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	37.0	0.0	68.0	0.0
Actual Paid Professional	49.0	0.0	38.0	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
871320	0	566490	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1037758	0	752620	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 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 climate change subject areas such as Floods and wildfire, topic areas for which UNL Extension provides little or no web content. In 2011, UNL Extension used eXtension extensively to identify quality resources for use in our response to the Missouri River flood. 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 2011, 21,000 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 523 responses were supplied by UNL Extension faculty. We have 147 faculty and staff that are members of 45 of 59 CoPs and 17 who provide leadership for CoPs.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	55000	110000	28800	57600

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

**Patent Applications Submitted**

Year: 2011

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2011	Extension	Research	Total
<b>Actual</b>	10	71	81

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

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

Year	Actual
2011	22

**Output #2**

**Output Measure**

- Number of workshops, continuing education programs, web-based curricula and field days/tours related to climate change.  
Not reporting on this Output for this Annual Report



**Output #3**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2011	10

**Output #4**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2011	0

**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**

<b>Year</b>	<b>Actual</b>
2011	8400000

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

24 million acres of range and pasture resources are a primary source of feed for 1.88 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 desert 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. In addition, high price for feed grains is increasing competition for land resources with range and pasture land conversion to crop production a growing trend. Maintaining the productivity and profitability of Nebraska range and pasture resources is essential to 20,000 businesses (beef cow operations) and to the rural infrastructure of much of Nebraska.

**What has been done**

Extension in Nebraska hosts many types of educational opportunities addressing integrated beef and range/pasture issues. Our highest dosage educational experiences are the High Plains and Nebraska Ranch Practicums that focus on the integration of beef and range systems. These courses are the equivalent of a 4 hour undergraduate education experience taught on research and commercial ranches in the Sandhills and Panhandle of Nebraska. Medium dosage experience come in the form of one-day to multi-day regional conferences such as the Nebraska Grazing Conference, Gudmundsen Sandhills Laboratory Open House, Beef Production Conference, Range Beef Cow Symposium, Mid-Plains Beef Education Series, West Central Cattlemen Days, Ranching for Profitability regional programs, Cow/Calf College, UNL Barta Brothers Field Days, and the 4 State Beef Conference. In addition, there are many local educational opportunities for both youth and adults addressing range ecology, range and pasture management, fire recovery, pesticide safety, and grasshopper and prairie dog control, to name a few. The Beef Action Team assembled evaluation data on 90 educational programs in 2011

which represent only a sampling of the educational experiences in beef and range productions systems.

**Results**

The Beef Action Team gathered post workshop evaluation data from participants of 90 educational experiences in 2011 that were attended by 1106 (70% of all participants) individuals associated with cow/calf production. End of meeting surveys suggested moderate or significant knowledge gain for grazing management (91% of participants) and pasture/range/meadow management (94%). The value of the information received on a per head basis was estimated by producers at \$8 for the 4-State Beef Conference, \$2.5 for the Beef Cow Symposium, \$14 for the NE Ranch Practicum, \$43 for the High Plains Ranch Practicum, \$25 for the Cow/Calf College. A follow survey returned by 307 participants representing 156,000 cows suggested that changes made based upon information received at Extension educational programs was \$13 to \$17 per head. Survey results further suggested for the topics of Grazing Management and Pasture/Range/Meadow Management, 32% and 11% had already made changes and another 52% and 46% planned to modify a current practice or planned to make new changes in the near future. The total number of cows managed by participants in the 90 educational programs was 405,000 cows and another 90,000 replacement heifers. The value of educational programs for cow calf producers was estimated to be approximately \$6.4 to \$8.4 million for the cow/calf industry. This value is inclusive of all changes made, not just range and pasture management changes.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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
315	Animal Welfare/Well-Being and Protection
605	Natural Resource and Environmental Economics

**Outcome #2**

**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
2011	88

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

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

**What has been done**

UNL Extension has delivered educational programs ranging from one-on-one in-field instruction to two-day long workshops that has engaged 1450 producers/consultants representing approximately 870,000 acres in 2011. One example is the Pivot Manufacturers project which trains pivot irrigation equipment dealers and their customers on water savings technologies and management practices specific to center pivot operation. An additional initiative, the Nebraska Agricultural Water Management Demonstration Network (NAWMDN) is designed to demonstrate technologies to improve irrigation management and water use efficiency. NAWMDN has expanded from 15 farmer collaborators/partners in 2005 to over 700 in 2011. An additional initiative, the NEBFLUX project, measures evapotranspiration and other plant and soil parameters for many different vegetation surface. It is the largest and most comprehensive network of its kind that is operated by a single laboratory in the United States. The project is providing extremely valuable data to state agencies (irrigation districts, NRDs, and DNR) for their designing, planning, and management of water resources and related infrastructures.

**Results**

Over 300 participants of our educational workshops responded to a post educational experience survey to determine the value of the information shared and the actual changes that resulted. The conclusions drawn from that survey include: 1) Over 870,000 acres impacted, 2) 88% of the participants indicated that the information influenced how much water they applied, 3) Average reduced water application was 2.1 inches, 4) Total reduced pumping of 1,790,000 acre-inches, and 5) Saved \$9.80 per acre reduced pumping costs or approximately \$8.5 million. NAWMN participants irrigated over 1,000,000 ac in 2011. Participant surveys showed average irrigation water savings of 2.0" for maize and soybean consistently for the last six years. With the total

irrigated acreage represented by the Network partners, this network alone has resulted in a total of 2,000,000 ac-in of reduction in water withdrawals. This single project resulted in estimated total energy savings of \$11,600,000 statewide. Because of the in-field demonstration of these technologies on producer farms involved in the NAWMN, farmers and consultants are changing their behaviors of how they manage irrigations and the Network is having significant impacts in terms of conserving water and energy resources. Irrigation water use data collected from 7 NRDs in 2011 suggested that water use was 88% of average water use in 2007-09. The original three NRDs for which water use data is available through 2005 have seen water use over the last 3 years at 86% of the volume used in 2005-07. While some of these shifts in water use are due to precipitation patterns, growing evidence exists that a combination of public policy changes, education, and producer awareness are producer sustained reductions in water use for irrigation.

#### 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 #3

##### 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
2011	33

##### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

The Republican River Compact allocates the water supply of the Republican River, originally set at 11% to CO, 49% to NE and 40% to KS. Natural Resource Districts have developed plans that are contributing towards achieving the targeted allocation than includes retirement of irrigated acres, improvements in efficiency of irrigation water use, and limitations on irrigation development. Observed reductions in Nebraska water use (discussed later) are a result of extension education, public policy, and changes in rainfall patterns.

### **What has been done**

1) The water balance of rainfed cropping is substantial influence on the water supply in semi-arid watersheds. Faculty are developing a consumptive use network using eddy covariance, Bowen ratio and lysimeter systems across Nebraska to measure evapotranspiration, plant performance and soil water conditions on a year-round basis for major land uses. Seven years of water use measurements for rainfed cropping systems have been completed for native pasture and riparian grasses in western NE. These data are used to describe the impact and to calibrate and verify models used to simulate watershed management. 2) The impact of invasive species, terraces and small reservoirs is being measured on the streamflow from watersheds. Faculty have digitized the location and size of all terraced land in the Republican Basin and surveyed 117 fields to determine the water storage capacity of existing terraces relative to design capacity. They have also developed datasets of soil properties, land use, and irrigated land for the Republican Basin. These data were used in the PotYield model from Kansas State University to simulate the water balance for the basin as affected by changes in land use. 3) Faculty have completed Water Optimizer models that provide guidance on allocating limited irrigation water for multiple crops, years and fields. They have also calibrated and evaluated the CROPSIM and AQUACROP models for eastern and west central Nebraska. Finally, we developed a deficit irrigation program for the USDA-RMA and conducted a pilot study of the program for the Central Great Plains. The USDA-RMA is currently working on implementation of the program. 4) A field research analysis with Kansas State University has been completed of how installation of conservation terraces and small watershed reservoirs has impacted the stream flow in the Republican River. The results suggest that terraces and small reservoirs have a) Increased evapotranspiration by approximately 36,000 acre-feet/year; b) Increased groundwater recharge by approximately 88,000 acre-feet/year; and c) Decreased stream flow by approximately 63,000 acre-feet/year. 5) Faculty serve on the Consumptive Use Subcommittee for the North Platte Decree Committee and the Conservation Practice Subcommittee for the NE Department of Natural Resources to incorporate research based information into public policy related to management of the Republican and Platte River Basins.

### **Results**

1) 2010 consumptive water use estimates (most current year for which consumptive use modeling is completed) suggest that Nebraska is using 33% if the total allocation. For the past five year running average, Nebraska is under its allocation by about 42,000 acre-feet. 2011 data will be published in August 2012. This is the fourth year in a row that Nebraska consumptive use is less than the value agreed upon in the interstate compact. 2) The deficit irrigation management program is being used to distribute limited irrigation water between crops, fields and years as well as during an actual growing season. The programs have found widespread interest in Kansas, Colorado, Oregon, Idaho and the southern Great Plains, as well as Nebraska. The analytical programs are primarily being used to develop management guidelines rather than direct producer application. One application is the use of this tool by the Deficit Irrigation Insurance program, a first for the USDA-RMA, which promises to pay very large benefits to producers in the West that are faced with tight water supplies. 3) Faculty research and involvement in agency committees on management of Republican and Platte River basins is contributing a stronger scientific and engineering basis for policy decisions. University developed modeling tools and field data are being increasingly integrated into agency estimates of consumptive use for the state of Nebraska.

Several NRDs and the DNR are using these modeling tools to evaluate implications for land use changes on consumptive water use and to transfer water rights and to assess conditions for the Cooperative Agreement.

#### 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
2011	520

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

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

###### **What has been done**

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



**Results**

In 2011, there were over 360 Baccalaureate and over 160 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**

<b>KA Code</b>	<b>Knowledge Area</b>
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
303	Genetic Improvement of Animals
305	Animal Physiological Processes
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection
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: Normal precipitation patterns conditions persisted through most of Nebraska in 2011 leading to normal irrigation water use, good recharge of aquifers, and steady or rising water tables in most of Nebraska. Abnormal upstream snow and rainfall events during the spring of 2011 produced record flooding levels in the Missouri river valley that persisted for more than two months causing extensive property, infrastructure, and cropland destruction. Extension invested extensive educational resources in helping homeowners and crop producers deal with this flooding over a six month period.

**Economy:** 2011 was a year of record setting crop prices for crops and overall farm income levels. Growth in foreign trade has also produced demand for livestock products to record levels although high feed grain costs has limited livestock producer incomes. Land values increased by an average of 31% in Nebraska in 2011. While farm incomes are generally at unprecedented levels, high farm input costs and land prices have created unprecedented risks in farming and need for risk management education. But overall, the farm economy is stronger than has been seen since the mid-1970s.

The continued strength of the corn-based ethanol industry and a growing wind energy industry has brought significant benefit to many rural areas. We remain at 24 active ethanol production plants in Nebraska, with a combined production capacity of over 2 billion gallons of ethanol each year--and requiring 769 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. Loss of federal blending credits and implementation of California standards for biofuels is creating some angst over future growth or maintenance of Nebraska's biofuels industry.

**Public policy and Government Regulations:** Public pressure by the Human Society of the US continues to cause significant concerns among all agricultural organizations. HSUS continues to maintain an active presence in Nebraska.

**Appropriation Changes:** Steady state tax collection and soaring federal deficits has led to static state and declining federal budget support in 2011 with significant federal reductions possible in 2012. Elimination of some research and extension program areas is anticipated.

**Competing public priorities:** A customer base that has little connection and no understanding of modern agricultural production systems and a desire to use public policy to design agricultural systems continues as a major frustration among the agricultural community. Some aspects of this public oversight of food production is seen as beneficial such as local foods production and organic systems because of potential for premium prices. However, the lack of acceptance by some groups of many production technologies for reducing inputs ( e.g. 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 meddling by their customers and policy makers that the agricultural community believes to be poorly informed.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

UNL Extension has divided into five spires of excellence with one specifically targeting climate change issues: 1) Water Climate and the Environment for Agriculture and 2) Water Climate and the Environment for Communities. The Action Team supporting each spire has identified one or more "Signature Outcomes" that first became active at the start of 2010. These "Signature Outcomes" continue to be delivered statewide in 2011 and establish methodologies for measuring statewide impact allowed capture of a significant part of our 2011 impact (see 'Making a Difference' in left hand column at <http://extension.unl.edu>). The faculty team supporting each spire is in the process of planning 2012 statewide

delivery and evaluation procedures identified in the statewide action plans. These teams are also learning about the issues surrounding the Challenge of Feeding 9 Billion People and the implications of these issues for future Extension Signature Outcomes. These methods developed by our Action Teams provided our second statewide snapshots of educational program impacts including knowledge gain, intended and actual practice change, and likely conditional changes.

### **Key Items of Evaluation**

Extension action team implementation plans, evaluation indicators and tools as well as 2011 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/progfocus/actionteam-water-climate-and-environment>.

**V(A). Planned Program (Summary)**

**Program # 3**

**1. Name of the Planned Program**

Sustainable Energy

**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	25%		0%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		34%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		27%	
205	Plant Management Systems	25%		23%	
511	New and Improved Non-Food Products and Processes	50%		16%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	19.0	0.0	7.0	0.0
Actual Paid Professional	13.0	0.0	7.0	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
297551	0	226703	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
302830	0	181514	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 (financial) productivity and sustainability advances in bioenergy systems using a variety of feedstocks (grains, grasses, and algae).
- Conduct research on feedstocks and processing technologies that underpin and will support future (financial) productivity and sustainability advances in bioenergy systems.
- 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, industrial processors, youth, and graduate and undergraduate students.

**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 energy subject areas such as farm, home, and wood, 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 2011, 21,000 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 523 responses were supplied by UNL Extension faculty. We have 147 faculty and staff that are members of 45 of 59 CoPs and 17 who provide leadership for CoPs.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	3200	0	100000	0

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

**Patent Applications Submitted**

Year: 2011  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2011	Extension	Research	Total
Actual	5	21	26

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of refereed journal publications related to sustainable energy.

Year	Actual
2011	0

**Output #2**

**Output Measure**

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

Year	Actual
2011	32

**Output #3**

**Output Measure**

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

Year	Actual
2011	5020

**Output #4**

**Output Measure**

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

Year	Actual
2011	4

**Output #5**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2011	1

**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**

<b>Year</b>	<b>Actual</b>
2011	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.

In 2011, over 1 billion kilowatt-hours were generated by utility-scale wind energy in Nebraska.. Nebraska has 196 operational wind turbines with a total capacity of 337.38 megawatts. The average annual output could power about 103,880 homes. Contracting of land for wind development has slowed in the last year due to the fast rush to sign most prime wind energy sites in 2008-2010. There are currently 24 active ethanol production plants in Nebraska, with a combined production capacity of over 2 billion gallons of ethanol each year and requiring more than 700 million bushels of grain in the process. The biodiesel and biomass based ethanol industries remain slow to develop in Nebraska. In 2011, no energy was produced in Nebraska from these two sources.

#### **What has been done**

Extension:

The 2011 4-H National Youth Science Day experiment was "Wired for Wind" (<http://www.4-h.org/4-h-national-youth-science-day/science-experiments-projects/>), an in-depth look at renewable energy technologies in the form of wind power. Developed by the UNL Extension program, this three-tiered experiment helps 4-H young people to enhance their science, engineering, technology and applied math skills. Youth nationwide learned about renewable energy, engineering design, and wind turbine design and function by participating in an experiment that allowed them to 1) Design, build and test different wind turbine models and

their scientific experiences to opportunities for their communities to harness the power of wind, and 3) Determine the best location for a wind farm in their area.

UNL faculty worked with a group of educators from MI, WI, and MO, to host a bioenergy track for the National Association of County Agricultural Agents - Professional Improvement Conference in 2011. The professional development track consisted of 12 seminars and two full day tours. Seminars were attended by 918 educators (duplicates counted).

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

## Results

### Extension:

"Wired for Wind" has been taught to more than 2,000 youth in Nebraska and has been taught in 48 states, two U.S. territories and two foreign countries. The number of students nationwide taught using our curriculum is estimated to be well over 100,000. See You Tube wrap up video showing some of the different events in the US. (<http://www.youtube.com/watch?v=vfVK-RI2D4U>). Nationally, the 2011 "Wired for Wind" experiment was successful in generating unprecedented numbers of participants. Other measures of success for the 2011 experiment include:

- \* More than 700 4-H Wired for Wind experiments were reported.
- \* Media coverage for this nationwide effort amounted to more than 223 million media impressions resulting from strong local and national print, broadcast, and Web media coverage.
- \* More than 5,200 Wired for Wind kits were sold in 2011.

The bioenergy track workshops and tours at National Association of County Agricultural Agents were attended by 918 Extension Educators. Educators completing evaluations four months after the conference indicated that 37% of respondents say they left the conference with new ideas or practices they intend to implement in their area.

In 2011, there were over 360 Baccalaureate and over 160 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
133	Pollution Prevention and Mitigation
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
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**

<b>Year</b>	<b>Actual</b>
2011	0

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

In 2011, over 1 billion kilowatt-hours were generated by utility-scale wind energy in Nebraska. Nebraska has 196 operational wind turbines with a total capacity of 337.38 megawatts. The average annual output could power about 103,880 homes. Contracting of land for wind development has slowed in the last year due to the fast rush to sign most prime wind energy sites in 2008-2010. There are currently 24 active ethanol production plants in Nebraska, with a combined production capacity of over 2 billion gallons of ethanol each year and requiring more than 700 million bushels of grain in the process. The biodiesel and biomass based ethanol industries remain slow to develop in Nebraska. In 2011, no energy was produced in Nebraska from these two sources.

#### **What has been done**

In 2011, Extension faculty investments were made in the area of biofuels education, alternative energy demonstration, and irrigation pumping plant efficiency. Education on contracting of land for wind development in 2011 included only one workshop, one face-to-face meeting with a landowners association board, telephone conversations, and maintaining the online content to ensure it is fresh and up to date. UNL has received a grant from DOE to develop research and demonstration of solar and wind energy systems. As part of the grant a solar array and two small wind turbines are being installed at a regional research farm in Northeast Nebraska with live internet streaming of data to follow in 2012.

UNL Extension partnered with USDA Rural Development to put on two, full day conferences focused on sustainable energy options including renewable fuels that were attended by 40 in Beatrice and 60 in Norfolk. By teaching producers about bioenergy crops now they will be better prepared to make decisions if and when an industry develops in their area. Extension education in biomass bioenergy crops is challenging due to the slow development of the biomass based

energy industry. UNL Extension faculty also successfully partnered with Iowa State University on a Regional CAP grant for biofuels production from biomass sources. Demonstrations of switch grass production and supporting workshops will be initiated in 2012.

Information collected during laboratory testing of diesel fuel, natural gas, ethanol, and propane engines is being used to develop a model for use in predicting engine performance based on a few simple measurements. The data is being used to develop engine performance information needed to update pumping plant performance criteria. Pumping plant performance tools will become an important Extension tool for selecting irrigation power units and evaluating the relative performance of existing irrigation systems. This project will further define conditions where ethanol powered irrigation pumps can be considered. A complimentary new project in collaboration with Michigan State University with funding from the US Department of Labor will provide a more extensive look at how to conduct energy audits of irrigation systems and how to summarize the information for clients. It is designed as a program for training individuals displaced by the economy to work in an energy conservation field. Finally, professional development for educators was delivered across the region with information they can use to teach irrigators about energy conservation associated with irrigation pumping plant efficiency, irrigation management, and pipeline design.

### Results

With most Extension efforts in 2011 focused on creating a research data base for future tools (irrigation pumping plant efficiency, solar , and wind energy development), professional development for extension educators, and awareness development in biomass based energy development (for which no market is available in 2011), there are no impacts to report from our 2011 Extension programs. It is hoped that many of the foundational research and educational efforts in 2011 will begin to deliver impacts in future years.

### 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

Economy: 2011 was a year of record setting crop prices for crops and overall farm income levels in large part due to the continued strength of the corn-based ethanol industry. We remain at 24 active ethanol production plants in Nebraska, with a combined production capacity of over 2 billion gallons of ethanol each year--and requiring 769 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. Instability of petroleum-based transportation energy prices continues to provide some encouragement for ethanol based energy production.

Public policy and Government Regulations: Loss of federal blending credits and implementation of California standards for biofuels is creating some angst over future growth or maintenance of Nebraska's biofuels industry. Instability of credits for biodiesel fuels has resulted in no production of this energy source in Nebraska in 2011 and mothballing of sites constructed to date. Electrical production ownership by public power authority and low Nebraska electrical rates have slowed wind energy development in Nebraska. However, changes in state law have begun to encourage public/private partnerships for wind energy development resulting in several new and proposed wind energy developments in 2011.

Appropriation Changes: Steady state tax collection and soaring federal deficits has led to static state and declining federal budget support in 2011 with significant federal reductions possible in 2012. Elimination of some research and extension program areas is anticipated.

Competing public priorities: The food vs. fuel debate continues to present some public relations challenges for the ethanol industry. However, other factors have continued to maintain a demand for ethanol. The current high prices for corn, due in part to ethanol demand, is creating a demand for additional acres for corn production resulting in fewer acres devoted to other row crops, small grains, and grassland.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

UNL Extension has divided into 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.

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 their dataset.

### **Key Items of Evaluation**

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

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

**V(A). Planned Program (Summary)**

**Program # 4**

**1. Name of the Planned Program**

Childhood Obesity

**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%		3%	
702	Requirements and Function of Nutrients and Other Food Components	15%		28%	
703	Nutrition Education and Behavior	25%		14%	
724	Healthy Lifestyle	25%		12%	
802	Human Development and Family Well-Being	10%		34%	
806	Youth Development	25%		9%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	37.0	0.0	15.0	0.0
Actual Paid Professional	22.0	0.0	11.0	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
442327	0	358547	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
572515	0	223342	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 will conduct research and deliver extension education programs that will enable Nebraskans to increase their consumption of foods that match their specific MyPyramid recommendations and increase their physical activity levels. A variety of teaching strategies will be used for program delivery including face-to-face education, distance learning technologies, and use of eXtension programming.

In addition, long-term research strategies are aimed at 1) using use genome-based technologies to develop individualized nutritional strategies that will impact chronic "lifestyle" diseases and obesity, and 2) developing bioactive foods that provide health-promoting functionality when consumed.

**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?**

eXtension continues to serve as a valuable resource for clients and faculty. In addition to being linked to all of our websites, eXtension is a resource for faculty in answering questions and providing wrap around programming for face-to-face training sessions. For example, the "Families, food, and Fitness site resources are used by content experts in nutrition and is often cited on our food.unl.edu site. In addition, as a follow-up to the "In Tune with Food and Fitness" program, participants are referred to eXension for additional resources and questions.

While indirectly related to obesity, UNL Extension is also using eXtension as a portal for their newly designed co-parenting program which is a part of a court mandated program for families going through divorce. By using eXtension as the platform, participants become more aware of the other resources eXtension has to offer.

In 2011, 21,000 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 523 responses were supplied by UNL Extension faculty. We have 147 faculty and staff that are members of 45 of 59 CoPs and 17 who provide leadership for CoPs.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	8000	16000	25000	50000

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

**Patent Applications Submitted**

Year: 2011  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2011	Extension	Research	Total
Actual	5	13	18

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

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

Year	Actual
2011	13

**Output #2**

**Output Measure**

- Number of extension in-depth workshops.

Year	Actual
2011	20

**Output #3**

**Output Measure**

- Number of Agricultural Research Division HATCH projects in childhood obesity, fundamental nutritional sciences, and family wellbeing.

Year	Actual
2011	6



**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**

<b>Year</b>	<b>Actual</b>
2011	2500

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

In Nebraska, over \$454 million dollars are spent annually on medical costs associated with adult obesity. 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**

One-on-one education, group meetings, on-line programs, social media, web sites, and educational applications (apps) are tools being used to teach MyPyramid (now MyPlate) recommendations to young people. Programs such as "5-4-3-2-1-Go!" were offered by Extension faculty statewide and emphasize the healthier eating and decreased screen time.

In order to better reach the target audience (youth), a new iPad app was developed by UNL Extension faculty. The "Snack Attack" app uses a gaming structure to help young people learn about appropriate snacks and how to make healthier choices that align with MyPlate guidelines. This app serves as one component of nutrition lessons and serves as the "hook" to get youth excited about health eating.

#### **Results**

In 2011, 24,000 young people were reached with educational programs aimed at increasing the consumption of foods that match MyPyramid guideline by UNL Extension. Of these, 70% reported increased knowledge of the food groups and eating a broader variety of foods. After participating in Nebraska's Nutrition Education Program (NEP), ninety-four percent of the nearly 21,000 youth participating were able to correctly identify a healthy snack, vs. 71% who were able

to do that prior to the program. One Nutrition Education Program (NEP) participant noted: "After we learned about the five food groups, I went home and told my mom about them. She cooked us supper with lots of healthy fruits and vegetables and I got to help her!"

#### 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
2011	500

#### 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**

In addition to helping teach young people about appropriate snacking choices, the UNL Extension developed "Snack Attack" app has physical activity breaks built in between each "level" of play. This helps decrease overall screen time while increasing physical activity levels. In addition, the Nutrition Education program teaches lessons on how to incorporate more physical activity into every day life.

##### **Results**

Of those 24,000 youth who participated in nutrition education programs offered through UNL Extension, 42% reported an increase in physical activity to recommended levels for their age group.

#### 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
2011	450

#### 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**

As a complement to youth nutrition and healthy lifestyles programs, UNL Extension also offers programs designed to help adults improve their physical and financial health. One such program is "Small Steps to Health and Wealth." This program use bi-modal teaching strategies (webinars plus face-to-face interaction) to help Nebraska adults make manageable, consistent steps toward improvement in their health and finances. By coupling these concepts together, participants are able to better see progress in two areas which stakeholders have identified as high need.

In 2010-11, 567 people with diabetes participated in UNL Extension's "Control Diabetes for Life"

program. This six-hour program helps participants establish new goals for diabetes self-management, control their blood sugar levels, and understand how physical activity contributes to the good health of a diabetic.

### **Results**

As a result of the "Small Steps to Health and Wealth" program, participants reported losing an average of 2.8 pounds through the nine-week course. While this doesn't seem particularly high, respondents also reported other program results. For example, one participant stated: "I feel better when I fix my own lunches rather than going out"; problems seem more manageable when I walk more frequently. Another stated: "Because of this program, I can control my high cholesterol with weight loss and exercise instead of pills."

As a result of the "Control Diabetes for Life" program, participants reported statistically significant changes in: using diabetes self-management techniques to control blood sugar levels, using carb counting to evaluate foods they eat daily, and understanding the role of sleep in glucose intolerance. Results of a one-year follow up survey showed that program participants had significantly either improved or 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%).

Estimates from the Department of Health and Human Services calculate the value of diabetes education at \$900 per person saved in medical costs and loss of earning due to illness. This calculates into a savings of over half a million dollars (\$510,000) in Nebraska during 2010-21011.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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
2011	50

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

With an increased need for scientists across the nation, a primary interest of Nebraska 4-H is to provide opportunities for youth to pursue science, engineering, technology, and applied math. It is anticipated that these traits and excitement will create a robust science pipeline that will be prepared to meet the challenges of multi-disciplinary issues like obesity. As a primary food producing state, 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 that increasingly suggest that the food we eat is directly linked to our overall health status.

#### What has been done

Nebraska 4-H is working to increase young people's interest and skill level in science by providing hands on learning experiences that encourage the development of science skills and abilities leading to an increase in science literacy amongst 4-Hers. We are doing this by developing comprehensive programming, curriculum, professional development, and resource materials for youth and adults. For example, as a result of Nebraska 4-H Science programming, 800 youth participated in the 2nd annual Robotics Expo. The Expo featured teams from around the state competing in the FIRST Lego League, the CEENBoT competition, and the new Jr.First Lego League competition for youth ages 6-9.

In addition, nearly 40 summer Gear Tech T-21 4-H Robotics Camps were held in 2011 serving nearly 1900 youth. An additional 57 robotics clubs were started with nearly 900 youth participating. Each of these experiences is a high dosage program focusing on science, engineering, and technology skills.

A holistic engineering curriculum centered on robotics the 4-H Robotics: Engineering for Today and Tomorrow curriculum was written, produced, and evaluated. The curriculum consists of three separate tracks, virtual robotics, junk drawer robotics, and platforms, each with three levels of content.

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

#### Results

A five-year tracking of Nebraska 4-H youth shows that science interest and skills are growing. For example, over the past five years, youth the number of youth respondents thinking a career in science, engineering, technology, or applied math would be exciting increase from 50% in 2007 to 91% in 2011. Also promising is the percentage of youth who have or will talk to someone who

works in the science, engineering, technology, and applied math career they are interested in increasing from 62% in 2007 to 72% in 2011. When compared to a national sample of 4-H youth and all youth, youth in Nebraska report more positive attitudes related to science.

Results of the content tests for Gear Tech T-21 4-H Robotics the camps showed a significant increase from the year one camp pre-test (M = 15.62, SD = 3.95) to the post-test scores (M = 19.00, SD = 6.40,  $t(307) = 12.70$ ,  $p < .000$ ) for the combined groups. When broken down by content areas (engineering ( $t(307) = 10.50$ ,  $p < .000$ ), programming ( $t(307) = 12.28$ ,  $p < .000$ ), mathematics ( $t(307) = 2.19$ ,  $p < .015$ ), geospatial technologies ( $t(307) = 4.19$ ,  $p < .000$ ), and engineering design ( $t(307) = .485$ ,  $p < .31$ ) the combined groups had significant increases from pre- to post-test in each area except for questions dealing with the engineering design process. Likewise, results of the 2010 attitude surveys showed an overall significant increase from pre- (M=3.98), to post-test (M=4.08,  $t(307) = 3.61$ ) which was driven by increases in student self-efficacy.

In 2011, there were over 360 Baccalaureate and over 160 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
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 nine billion people, global water supplies, and how those will impact our work related to childhood obesity.

#### V(I). Planned Program (Evaluation Studies)

##### Evaluation Results

See results section. In addition, 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 their 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 2011, 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/>



**V(A). Planned Program (Summary)**

**Program # 5**

**1. Name of the Planned Program**

Food Safety

**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%		26%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	30%		5%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	30%		44%	
806	Youth Development	10%		25%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	28.0	0.0	13.0	0.0
Actual Paid Professional	27.0	0.0	13.0	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
559900	0	234587	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
625203	0	287211	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 use 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 (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.

In 2011, 21,000 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 523 responses were supplied by UNL Extension faculty. We have 147 faculty and staff that are members of 45 of 59 CoPs and 17 who provide leadership for CoPs.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1500	3400	1900	20000

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

**Patent Applications Submitted**

Year: 2011

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2011	Extension	Research	Total

<b>Actual</b>	3	28	31
---------------	---	----	----

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2011	28

**Output #2**

**Output Measure**

- Number of extension in-depth workshops.

<b>Year</b>	<b>Actual</b>
2011	20

**Output #3**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2011	37

**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**

<b>Year</b>	<b>Actual</b>
2011	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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
2011	350

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Foodborne illness creates an enormous social and economic burden on communities and health systems. In the United States diseases caused by major pathogens alone are estimated to cost up to \$35 billion annually in medical costs and lost productivity. Because food production and processing are economic drivers of this state, implementation of food safety strategies is especially important.

#### What has been done

UNL Extension is the "go to" organization for food safety education for the meat processing industry, food service providers, and consumers. For example, UNL Extension reached 137 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.

In a new program offered through UNL Extension, 600 child care providers received food service safety training as part of a distance education program. In addition, UNL Extension reached 683 foodservice managers with 12 hours of training related to food safety and sanitation through the ServSafe course with a statewide pass rate of 86%.

The research components of the new USDA grant, "Food Safety for Diverse Families (Native American and Hispanic) with Young Children" has begun. Two graduate students have completed their research proposals and have submitted their IRB's for conducting the knowledge survey validation and focus groups. The project is a Multi-state project with the University of New Mexico

Based on USDA recommended storage time for leftovers, a social media campaign to promote food safety was developed: "4 Day Throw Away". A mascot was created and was the main character who conveyed the "4 Day Throw Away" message. Social marketing drove the development of the campaign. Traditional media (press releases, radio PSAs) and mascot appearances at grocery stores were conducted. The website ([4daythrowaway.com](http://4daythrowaway.com)) contains videos with interactive polling, and food safety myths. The videos help families understand the importance of using leftovers within four days or throwing the items away. The "4-Day Throw Away" application software (app) features hundreds of individual food items, storage recommendations, reheating instructions and special considerations around food safety. The app also gives information on related foodborne illnesses, with details on symptoms, duration,

complications and prevention.

### Results

As a result of HACCP education, participants indicated that they felt more comfortable in utilizing the HACCP principles in their programs and indicated that they would be using them regularly. The overall comfort levels of the participants for working with HACCP plans increased after completion the course. The participants also indicated that they would use HACCP principles in their programs more often than they did previously.

A research project on the impact of meat product mixing time on cooked product quality when reduced salt (sodium) levels are used or when salts of organic acids used as antimicrobial ingredients was conducted. Because the reduction of salt (sodium chloride) in meat products can impact food safety and shelf life and greatly impacts the texture and quality of meat products, this work will help meat processors understand the effects of reduced salt in their formulations and processing techniques that can enhance product quality.

Childcare Providers who participated in the Web-based Food Safety Training reported improvements in several areas. For example, 51% increased their use of thermometers to measure food temperatures, 57% increased their thermometer calibration, 41% increased efforts to prevent cross-contamination, 46% implemented a food allergy plan; and 51% explained food allergies to older children.

Pre and post surveys from revealed that ServSafe participants had an average of 35% increase in knowledge about proper cooking temperatures. Significant improvements ( $p = 0.0001$ ) in knowledge were also found for the participants knowledge of holding temperatures and sanitizing practices.

As a result of "4 Day Throw Away" new audiences that may not be familiar with Extension were reached with food safety education via social media and traditional methods. While impact data re still being collected, process evaluation is showing positive results of the campaign. The first nine months of the campaign resulted in 1,924 actual users and 6,429 total sessions. There were a total of 3,804 pageviews, 8,845 video views on YouTube, 18,914 post views for Facebook and 48 followers on Twitter. Users were identified as 80% female, of which 60% were between 18-44 years old.

## 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**

<b>Year</b>	<b>Actual</b>
2011	250

#### **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 2007-2011 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 nine 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-H'ers are then empowered to connect the dots between that set of skills and potential careers. In 2011, a new career app was developed.

##### **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, with an increase from 35% in 2009 to 87% in 2011. This strong increase is a result of Nebraska 4-H staff and volunteers providing opportunities for youth to talk with a person in a career related to their 4-H program or project (58% in 2010 to 72% in 2011). In addition, there has been an increase in the percentage of youth who recognize they are learning skills through 4-H that they could use in a future job; 92% in 2008 to 97% in 2011. These are all indicators that in



the future, the youth of Nebraska 4-H will be better prepared to achieve economic stability and be successful contributors to their communities. Each of these results will help ensure that the needs of the scientific community around food science are met.

#### 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 their 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 2011, 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/>