

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

**Program # 1**

**1. Name of the Planned Program**

Global Food Security and Hunger

Reporting on this Program

**V(B). Program Knowledge Area(s)**

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
121	Management of Range Resources	10%		2%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		12%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	2%		8%	
205	Plant Management Systems	28%		6%	
206	Basic Plant Biology	0%		7%	
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%		5%	
302	Nutrient Utilization in Animals	4%		9%	
303	Genetic Improvement of Animals	1%		1%	
305	Animal Physiological Processes	1%		7%	
307	Animal Management Systems	20%		4%	
402	Engineering Systems and Equipment	1%		2%	
601	Economics of Agricultural Production and Farm Management	6%		1%	
806	Youth Development	10%		3%	
	<b>Total</b>	100%		100%	

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

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

Year: 2012	Extension		Research	
	1862	1890	1862	1890

Plan	65.0	0.0	73.0	0.0
Actual Paid Professional	112.0	0.0	117.0	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
2264740	0	2548483	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
2482695	0	2866566	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 their make decisions regarding natural resources and climate issues. The program will provide agency staff with the knowledge they need to carry out the agency responsibilities and mandates.

**3. How was eXtension used?**

eXtension 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**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	15300	265600	30100	29500

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

**Patent Applications Submitted**

Year: 2012

Actual: 3

**Patents listed**

Methods and Materials for Making and Using Transgenic Dicamba-Degrading Organisms.  
 Plants With Useful Traits and Related Methods.  
 Thermoplastics from Distillers Dried Grains and Feathers.

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

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
<b>Actual</b>	25	259	284

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

**Output Target**

**Output #1**

**Output Measure**

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

Year	Actual
2012	64

**Output #2**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	500

**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>
2012	25

**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>
2012	17

**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>
2012	261000000

### **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**

We estimate that in 2012, Extension faculty hosted educational workshops that produced about 71,000 learner-hours attended by approximately 16,000 youth and adults of education in Beef Systems and 87,000 learner-hours attended by 18,000 youth and adults in cropping systems. In addition, the web is an increasingly important part of our educational program delivery. UNL Extension hosts 7 umbrella websites for combining content from a faculty team under a common theme. These umbrella websites target the work of UNL Extension's eight action teams. Our CropWatch web site hosted 160,000 unique visitors viewing 563,000 pages annually. Our Extension Beef web site was accessed by 77,000 unique visitors in 2012 who viewed 186,000 pages. Our Food web site addressing consumer issues as well as local foods production topics received 511,000 unique visitors and 1,085,000 page views. Overall, Extension state, county, umbrella content, and publications web sites hosted 3.9 million visitors in 2012 with 7.3 million pages being viewed.

Nebraska's beef industry is facing significant challenges due to widespread severe drought across the state. UNL extension faculty in the beef spire has targeted drought as primary focus of educational programming in 2012. Our beef extension faculty have answered more than 780 individual clientele requests, authored or prepared over 114 written articles, 7 extension peer-reviewed publications, and 36 web pages; created 93 radio or television presentations; produced

an additional 121 video or audio recordings for posting in social media or a website; and taught 68 workshops attended by 3221 total participants.

In addition to addressing drought, UNL Extension's Beef Systems programs have focused on 1) Improving the competitiveness, diversity, sustainability and profitability of Nebraska's beef producers, 2) Adoption of approaches to animal care that improve health, well-being, quality and wholesomeness, 3) Improving business and management skills, 4) Increasing consumer education about beef systems. Example programs include ranching practicums (targeting ranchers) that deliver in-depth educational programming, locally delivered Ranching for Profitability educational programs (targeting ranchers); Feedlot Roundtables (targeting feedlot managers and consultants) and Feedlot Schools (targeted feedlot employees); Husker Ag SMARTS for business and entrepreneurship (targeting integrated cow calf and crop farmers); Beef Systems Home Study Course emphasizing nutrition and health, satellite delivery of the latest research through Beef Satellite Short Course, national leadership for web delivery including Ask an Expert through eXtension; and workshops and field days for small animal feeding operations on application of vegetative treatment systems.

UNL Extension's Cropping Systems focus on 1) improving yield, competitiveness and profitability, 2) crop protection and fertility best practice adoption, 3) farm business and risk management, and 4) efficiency of input utilization. Examples of program delivery models implemented include Nebraska On-Farm Research pilot program with 27 growers completing 33 conventional studies and 7 growers completed 7 organic studies (<http://cropwatch.unl.edu/web/farmresearch>); Soybean Management Field Days that combines on-farm research plots with in-field summer workshop and winter review of research results at four locations; Crop production clinics at eight locations addressing crop protection and other agronomic and business management topics; No Till conference and supporting field days; and crop management diagnostic clinics in eastern Nebraska and Panhandle of Nebraska targeting crop consultants and agribusiness professionals; and Soybean Cyst Nematode field days.

The Nebraska Women in Agriculture Conference covers issues related to livestock, crops, and farm management topics. The 2012 conference was attended by 398 participants.

## Results

In 2012, 47 beef programs totaling 223 contact hours were evaluated across the state. Eleven-hundred and thirty producers and other agribusiness specialists representing over 11 million head of livestock and 8.6 million acres attended one or more of these programs. Almost 800 participants responded about the impact of attending one of these programs suggesting that participants of UNL Extension Beef programs reported an estimated average value in profitability of \$17.00 per head.

Cow Calf workshop participants reported changes made as having a value of \$12.5 million. Evaluation of feedlot participants in the Feedlot Roundtables suggested that changes were estimated to have an approximate value of \$81.3 million. Evaluation of the beef business programs was estimated by participants to have a value of approximately \$1.8 million. Education on Vegetative Treatment System design for managing open lot runoff was shared with 100 consultants who reported that they influence environmental decisions on about 1.3 million head annually.

Examples of results from cropping systems related programs include:

\* Participants in Nebraska's No-Till Conferences adopted no-till practices, maintained current profit, or increased profit \$13/acre equating to about \$3.3 million.

\* Participants (1501) in Crop Production Clinics reported directly managing or influencing

management decisions on 21.3 million acres of cropland including 8.6 million acres of irrigated land and a value of the likely practice changes returning \$17.5 to \$34.6 million to their businesses.

\* Participants (402) in 2012 Soybean management Field Days reported directly managing or influencing producer decisions on 300,000 acres and estimated the value of the anticipated changes in practice of \$7.50 per acre or \$30.2 million in total.

\* Participants (307) in the one-day Crop Management Diagnostic Clinics reported directly managing 251,000 acres and or influencing decisions on 7 million acres with an estimated economic value of anticipated changes of \$7.40 per acre or \$53 million.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management
806	Youth Development

#### Outcome #2

##### 1. Outcome Measures

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

##### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
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2012

59

### 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 Extension's 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 2012, Extension faculty hosted educational workshops that produced about 71,000 learner-hours attended by approximately 16,000 youth and adults of education in Beef Systems and 87,000 learner-hours attended by 18,000 youth and adults in cropping systems. In addition, the web is an increasingly important part of our educational program delivery. UNL Extension hosts 7 umbrella websites for combining content from a faculty team under a common theme. These umbrella websites target the work of UNL Extension's eight action teams. Our CropWatch web site hosted 160,000 unique visitors viewing 563,000 pages annually. Our Extension Beef web site was accessed by 77,000 unique visitors in 2012 who viewed 186,000 pages. Our Food web site addressing consumer issues as well as local foods production topics received 511,000 unique visitors and 1,085,000 page views. Overall, Extension state, county, umbrella content, and publications web sites hosted 3.9 million visitors in 2012 with 7.3 million pages being viewed.

Nebraska's beef industry is facing significant challenges due to widespread severe drought across the state. UNL extension faculty in the beef spire has targeted drought as primary focus of educational programming in 2012. Our beef extension faculty have answered more than 780 individual clientele requests, authored or prepared over 114 written articles, 7 extension peer-reviewed publications, and 36 web pages; created 93 radio or television presentations; produced an additional 121 video or audio recordings for posting in social media or a website; and taught 68 workshops attended by 3221 total participants.

In addition to addressing drought, UNL Extension's Beef Systems programs have focused on 1) Improving the competitiveness, diversity, sustainability and profitability of Nebraska's beef producers, 2) Adoption of approaches to animal care that improve health, well-being, quality and wholesomeness, 3) Improving business and management skills, 4) Increasing consumer education about beef systems. Example programs include ranching practicums (targeting ranchers) that deliver in-depth educational programming, locally delivered Ranching for Profitability educational programs (targeting ranchers); Feedlot Roundtables (targeting feedlot managers and consultants) and Feedlot Schools (targeted feedlot employees); Husker Ag SMARTS for business and entrepreneurship (targeting integrated cow calf and crop farmers); Beef Systems Home Study Course emphasizing nutrition and health, satellite delivery of the latest research through Beef Satellite Short Course, national leadership for web delivery including Ask an Expert through eXtension; and workshops and field days for small animal feeding operations on application of vegetative treatment systems.

UNL Extension's Cropping Systems focus on 1) improving yield, competitiveness and profitability, 2) crop protection and fertility best practice adoption, 3) farm business and risk management, and 4) efficiency of input utilization. Examples of program delivery models implemented include

Nebraska On-Farm Research pilot program with 27 growers completing 33 conventional studies and 7 growers completed 7 organic studies (<http://cropwatch.unl.edu/web/farmresearch>); Soybean Management Field Days that combines on-farm research plots with in-field summer workshop and winter review of research results at four locations; Crop production clinics at eight locations addressing crop protection and other agronomic and business management topics; No Till conference and supporting field days; and crop management diagnostic clinics in eastern Nebraska and Panhandle of Nebraska targeting crop consultants and agribusiness professionals; and Soybean Cyst Nematode field days.

The Nebraska Women in Agriculture Conference covers issues related to livestock, crops, and farm management topics. The 2012 conference was attended by 398 participants.

### **Results**

In 2012, 47 beef programs evaluated by almost 800 participants responded that participants of UNL Extension Beef programs gained moderate to significant knowledge (95% of participants) in one or more subject matter areas and developed plans to improve current practices or begin new practices in one or more subject matter areas (57%).

Cow Calf evaluations indicated common changes by respondents produced improved grazing management (64%), nutrition (69%), pasture and range management (59%), reproductive management (62%), and genetics (49%). The feedlot evaluations indicated that 48% of respondents anticipated making changes as a result of UNL Extension educational programs. Common changes indicated by respondents addressed cattle health, handling and care (62%), nutrition, rations and feeding (50%), and environmental issues (49%). Evaluation of the beef business programs indicated changes being made or likely to be made by 66% of respondents as a result of UNL Extension educational programs. Common changes indicated by respondents addressed business management and decision making (72% of participants), financial/economic decisions (73%) and risk management (59%). Education on Vegetative Treatment System design for managing open lot runoff was shared with 100 consultants who reported a significant improvement in their knowledge of this technology (91% of participants). These individuals work mostly with beef systems (78%) as technical service providers and indicated that they influence environmental decisions on about 1.3 million head annually.

Examples of results from cropping systems related programs include:

- \* Participants in Sustainable agriculture programs reported 72% of program participants significantly increased knowledge in alternative agriculture production practices and 72% significantly increased knowledge in crop and livestock diversity to improve soil health.

- \* Participants (1501) in Crop Production Clinics reported 54% of attendees reported moderate or greater knowledge of crop management practices that will reduce input costs and/or increase yields, likely behavior changes related to personal and employee health and safety (88% of participants), reduced environmental contamination from pesticide (61%), improved irrigation efficiency (55%), practices leading to increase yield or reduced input costs (54%) .

Participants in the 2012 Nebraska Women in Agriculture Conference reported influencing or directly making decisions on 237,000 acres and 59,000 head of livestock. Participants in the 2012 Nebraska Women in Agriculture Conference reported that past participation in the conference was influential relative to changes in marketing grain for 37% of participants, farm budgeting and records for 45% of participants, animal ID and tracking implementation for 33% of participants, and marketing of livestock for 32% of participants. In addition, past participant reported that already implemented changes have increased farm/ranch profitability for 45% of participants and improved business effectiveness for 57% of participants.

#### 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>
2012	6540

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

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

The 2012 Nebraska Groundwater Quality Monitoring Report states "The data does indicate that overall, since the 2005 report the number of analyses for nitrate greater than 10 mg/l has decreased. As discussed previously in this report, data from 1994 to 2012 is more representative of the "statewide" concentration of nitrogen and indicates a slight upward trend. Utilizing the data from the NRDs' Statewide Groundwater Monitoring Network, for both short term and long term analysis, there are a greater number of wells that show an increase than show a decrease. There is not enough recent data for atrazine, alachlor, metolachlor, or simazine to conduct any trend analyses." The 2012 Water Quality Integrated Report defines long term trends for atrazine in 10 lakes and 26 streams. The analysis suggests that atrazine levels are declining in 4 lakes and 6 streams, remaining stable in 2 lakes and 18 streams, and increasing in 1 lake and 2 streams.

### **What has been done**

The Commercial/Noncommercial Pesticide Safety Education Program currently licenses over 9,518 people as commercial and noncommercial pesticide applicators in Nebraska with approximately 2,978 pesticide applicators trained in 2012. The 2012 Private Pesticide Safety Education Program trained an additional 3,562 participants with a total of 21,459 private applicators certified in Nebraska.

In 2011, UNL Extension deployed iPads and mobile internet service to all Extension Educators in Nebraska. In 2012 two new Apps were developed by UNL Extension addressing Western Bean Cutworm Speed Scout and Aphid Speed Scout. In addition, a new online self-paced private applicator certification training option was pilot tested and then released this past year with 92 individuals completing registration on line. To support both the on-line and face-to-face certification processes, 10 new (or substantially revised) publications and 10 new (or substantially revised) videos were published.

Primary delivery mechanisms for 2012 programs included an Educator Forum (train the trainer workshop), eight crop production clinics, multiple IPM School targeted clinics, pesticide container recycling program, and 26 private applicator workshops and multiple additional commercial. In addition innovative application of web tools has been applied through a Pest Private Eye Video game and pesticide safety staff connecting with clientele through Facebook, Twitter, You Tube, and blogging to connect with clientele.

### **Results**

Private Pesticide Safety Education Program: Participants in the 2012 indicated that their past participation in pesticide safety education has produced reductions in pesticide use (23%) of participants, regular monitoring to correctly identify pest problems (72%), safe pesticide storage, handling and application practices (93%), application of BMS to reduce contamination (89%), and use of IPM control strategies (76%).

Commercial/Noncommercial Pesticide Safety Education Program: Participants in 2012 indicated that their past participation in pesticide safety education has produced reductions in pesticide use (28%) of participants, regular monitoring to correctly identify pest problems (81%), safe pesticide storage, handling and application practices (95%), application of BMS to reduce contamination (94%), and use of IPM control strategies (82%).

Crop Production Clinics: 54% of attendees reported improved knowledge of crop management practices that will reduce input costs and/or increase yields. 61% reported that they are already using best management practices to reduce pesticide contamination of the environment, and 26% intended to change their behavior based on what they learned. 2012 Clinic attendees influence

ca. half of Nebraska crop production acres or about 10-11 million acres.

Crop Management & Diagnostic Clinics: About 50% of participants learned new knowledge about soybean aphid scouting and management; 70% of the participants learned new knowledge on corn and soybean disease identification; 67% learned new knowledge on more effective use of fungicides for disease management; 63% learned new knowledge of management of herbicide resistant weeds.

UNL Extension yard and garden programs: In 2012, it is estimated that the show reached 4,500 listeners, 43% "identified pest problems before applying chemicals" as opposed to just spraying "Sevin" on the tree, shrub, vegetable, annual or perennial and 36% "changed plant choices to utilize more diversity in the landscape" to allow for less problems if a new plant disease or insect comes along.

#### 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

<b>Year</b>	<b>Actual</b>
2012	0

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

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

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

### **What has been done**

Extension: Extension provides in-depth education leading to certification for crop consultants (Crop Management Diagnostic Clinics discussed previously), Commercial Pesticide Applicators (discussed previously), well drillers, and rural septic system installers. In addition, Extension faculty deliver in-depth education to agricultural producers and other clientele in the area of DNA Technology and marker assisted selection for beef systems (120 workshop participants), Ranch Practicum for cattle producers using curriculum derived from the systems based research of the University of Nebraska through (2 8-day course worth 4 hours of undergraduate credit delivered to 70 ranchers), and the Nebraska Agricultural Technologies Conference which engages farmers and agribusiness (175 participants in 2012) in emerging GPS related technologies, site specific management and on-farm research. UNL Extension in cooperation with the Nebraska Corn Board has initiated a transformational education program for engaging top crop farmers and 4-H and FFA youth in on-farm research programs to gather production performance for common management and technology use decisions.

### **Results**

Extension: 348 Nebraska onsite wastewater treatment professionals participated in one of 15 6-hour training opportunities. These individuals work with just under 4,000 systems treating 250 million gallons of wastewater annually. Impacts include changes in conducting soil percolation tests (32% of participants), changes in design of treatments systems (34%) and their installation (32%), and changes in discussion of system management with owners (54%).

The pilot year of the Nebraska On-Farm Research program include 27 growers who participated in 33 on-farm comparisons and an addition 11 youth in 7 teams as part of the Innovative Youth Corn Challenge. More information is available at:

<http://cropwatch.unl.edu/web/farmresearch/home> . The results (<http://ardc.unl.edu/2012-FINAL%20NOFRN-FebResearchUpdateReport.pdf>) from the growers were shared with 100+ producers the following winter. The intent is to expand to 75 on-farm research comparisons in

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
121	Management of Range Resources
201	Plant Genome, Genetics, and Genetic Mechanisms
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301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
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305	Animal Physiological Processes
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402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management
806	Youth Development

#### **V(H). Planned Program (External Factors)**

##### **External factors which affected outcomes**

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

##### **Brief Explanation**

Natural disasters: Extreme drought conditions arrive in Nebraska during the spring of 2012 and persisted through the remainder of the year. The drought dramatically reduced forage produced, forced many dryland crops to be harvested as forage or hay, and created higher than normal levels of aflatoxin in corn. Weather service outlooks indicate that these conditions will persist into 2013. Federally subsidized crop insurance covered an estimated \$1.5 billion in crop losses in Nebraska from the 2012 drought.

Economy: 2012 was a year of record setting crop prices for crops and solid year for farm income levels for crop producers. Because of the high grain and forage costs and lack of range and pasture grass production, livestock farmers experience unparalleled feed costs. For ranchers, their ability to secure sufficient forage has forced many to move cows into dry lot production space or significantly down size cow herds. The historical trend of downsizing the beef cow herd as well as cattle placement on feed continued in 2012 and is expected to accelerate in Nebraska in 2013 due to drought conditions. Despite the challenges faced by Nebraska cattle producers, U.S. poultry, egg and pork shipments exceeded previous highs for value and volume set in 2011. International beef sales dipped slightly in volume but broke the previous value record.

According to Bruce Johnson (published in Cornhusker Economics, March 20, 2013, [http://agecon.unl.edu/c/document\\_library/get\\_file?uuid=7fcaa994-3cda-4041-85e2-9e701058cb1b&groupId=2369805&.pdf](http://agecon.unl.edu/c/document_library/get_file?uuid=7fcaa994-3cda-4041-85e2-9e701058cb1b&groupId=2369805&.pdf) ) "Despite an extreme drought and indicators of weaker agricultural earnings on the horizon, the markets for agricultural land in Nebraska have remained strong into early 2013. Preliminary findings from the 2013 University of Nebraska-Lincoln Nebraska Farm Real Estate Market Developments Survey show the state's all-land average value rose **25 percent** over the 12-month period ending February 1, 2013 (Figure 1 on next page and Table 1 on page 3). Following on the advances for each of the previous two years of 22 percent and 32 percent, respectively, the 2013 all-land value of

\$3,040 per acre is more than double the value of just three years previously, in early 2010."

**Nebraska Energy Production:** According to a recent Associated Press story by Brandon Nelson, "With corn becoming an increasingly scarce commodity, the ethanol business is feeling the pinch. The persistent drought is taking its toll on the industry and has forced about 20 ethanol plants nationwide to halt production on the corn-based fuel. Data recently provided to the Associated Press by The Renewable Fuels Association shows nearly two-dozen of the nation's 211 ethanol plants have stopped production during the past year. Production is unlikely to resume before the 2013 corn harvest in late August or September and the down time affects the state's production as six of the stalled plants are in Nebraska." At the beginning of 2013, seven of Nebraska plants were either shutdown or idled representing about 30% of the capacity in this state.

**Public policy and Government Regulations:** Lack of a five-year farm bill was the primary public policy discussion in 2012. Disappearance of all USDA safety net for ranchers experiencing extreme drought is likely to speed downsizing by many ranches and loss of some ranch businesses in 2013.

**Appropriation Changes:** Steady state tax collection and soaring federal deficits has led to static state and declining federal budget support in 2012. Sequestration is likely to cause reductions within Extension programs possibly starting in 2013. However, the growth in student enrollment has resulted in UNL adding 36 new positions in 2013, with approximately 6 having Extension responsibility.

**Competing public priorities:** A customer base that has little connection and no understanding of modern agricultural production systems and a desire to use public policy to design agricultural systems continues as a frustration among the agricultural community. Some aspects of this public oversight of food production is seen as beneficial such as local 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. In spite of one of the worst droughts on record, better seed genetics has contributed to 2012 corn yields exceeding almost all previous yields prior to 1992. These competing public priorities are leaving farmers frustrated with consumer and policy maker scrutiny.

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

### **Evaluation Results**

UNL Extension has 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 2012 and establish methodologies for measuring statewide impact allowed capture of a significant part of our 2012 impact (see "Making a Difference" at <http://extension.unl.edu>). The faculty team supporting each spire is in the process of planning 2013 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.

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 2012 Impact reports are all found at <http://www.extension.unl.edu/web/Extension/progfocus> . A review of the specifics of these implantation and evaluation plans are found for the two most relevant action teams by going to <http://www.extension.unl.edu/web/Extension/progfocus/actionteam-beef> and <http://www.extension.unl.edu/progfocus/actionteam-crops-of-the-future>