V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Food Safety

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
311	Animal Diseases	0%		79%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	30%		21%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	70%		0%	
	Total	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	1.6	0.0	4.3	0.0
Actual Paid Professional	0.1	0.0	2.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
2384	0	233974	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
4922	0	327190	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
5200	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research - experiments are being conducted to evaluate genetic differences between dairy animals in their innate response to infection and are being conducted with mammary epithelial cells and dermal fibroblast cells to evaluate differential responses to various pathogens and pathogen associated molecular patterns (PAMPS) in vitro. Other research involved the study of mastitis resistance to enhance dairy food safety. Development of a coating material containing polymerized whey protein which has good flexibility and is waterproof for several days. This type of material would be suitable for disposable food containers.

Extension - Food Safety and Sanitation, Food Production in Business and GAP - Work with small scale producers on best practices that enable them to provide a safe food product. Good Agricultural Practice (GAP) certification work will occur with producers and collaborative efforts with Agencies, local government and farmers markets are pursued. Evaluation efforts are focusing on producers and processors adopting best management practices (BMP) for production, processing and handling of food. Adoption of these BMP will contribute to the long term goal of a sustainable agriculture industry therefore best captured within the Global Food planned program.

A few radio programs were conducted on general food safety topics and in reaction to the recent flooding from Tropical Storm Sandy a number of materials were produced and disseminated widely to food hubs.

2. Brief description of the target audience

- Dairy farmers
- Research scientists
- Consumers
- Environmentalists
- Public: General
- Small scale meat and produce farmers

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	5000	0	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	2	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Consultations
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Field day/Fair
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Newsprint Article
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Workshop Series
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Workshop - single session
  Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Radio Program

Year	Actual
2012	2

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase and maintain collaboration on events with agency and industry personnel to address safety (farm, food, etc.) and emergency preparedness
2	Increase in number of fair, field days or event attendees who demonstrate an increased understanding of the health risks associated with the failure to wash hands
3	Number of people who show improvement in food safety and preservation practices
4	Number of farms that pass the USDA GAP audit
5	Number of models that study genetic differences between dairy cows that impact their ability to resist mastitis.
6	Number of cell culture models that investigate animal differences in their response to mastitis causing pathogens.
7	Number of new technologies that improve food packaging.

Outcome #1

1. **Outcome Measures**

   Increase and maintain collaboration on events with agency and industry personnel to address safety (farm, food, etc.) and emergency preparedness

   Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

   Increase in number of fair, field days or event attendees who demonstrate an increased understanding of the health risks associated with the failure to wash hands

   Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

   Number of people who show improvement in food safety and preservation practices

   Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

   Number of farms that pass the USDA GAP audit

   Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

   Number of models that study genetic differences between dairy cows that impact their ability to resist mastitis.

2. **Associated Institution Types**

   - 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Knowledge of these genes will lead to more accurate selection of disease resistance characteristics of cows. This will further research in the mastitis field.

What has been done
The model evaluates the ability of dermal fibroblasts (cells) to respond to mastitis-causing bacteria. The scientist is now evaluating differential responses between animals from their unique herds being maintained at the University of Minnesota.

Results
As a result, the scientist found substantial variation between cows. The scientist found a lack of differences in fibroblasts (cells) obtained from animals that were selected based on genetic estimation. Key findings are that the fibroblast (cell) model is very responsive to stimulation with mastitis causing pathogens.

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases

Outcome #6

1. Outcome Measures

Number of cell culture models that investigate animal differences in their response to mastitis causing pathogens.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Studying how cows are susceptible to mastitis is a concern of Dairy farmers and scientists. Differences in invasion potentially could highlight pathogens of particular concern, whereas differences between cells of different cows would be suggestive of a specific host.

What has been done
Experiments have been conducted with mammary epithelial cells and dermal fibroblast cells to evaluate differential responses to various pathogens and pathogen associated molecular patterns (AMPS) in vitro. The model will be used to determine if differences exist between strains of bacteria in their ability to invade and survive within the bovine cells.

Results
As a result, the scientist finds that mammary cells can be isolated from milk and respond with production of chemokine, a protein that prompts white cells to move so they can carry out their immune system function. The scientist has observed consistency of response between three separate occasions from one cow.

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases

Outcome #7

1. Outcome Measures

Number of new technologies that improve food packaging.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The project addresses the issue of development of commercially-viable, environmentally-safe alternatives to packaging materials currently on the market. The majority of packaging which provides good quality barriers is made from synthetic plastics and these have a substantial impact on the environment when disposed of as waste. The consumer will benefit from the project outcome as there is a decreased risk of chemical intake from this type of product.

What has been done
Nanoclays such as smectite clays are relatively inexpensive, widely available and have low environmental impact. The scientist experiment was adding nanoclays to whey protein solution(s). Laboratory trials were completed including coating procedures, optimum depth of layers, flexibility and appearance, water/oil resistance, shelf life, microbial resistance and oxygen permeability.

Results
As a result, the scientist developed a coating material which has good flexibility and is waterproof for several days. This type of material would be suitable for disposable food containers. This new product will provide another healthy food choice for health conscious consumers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Other (Food safety requirements of food)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Improve mastitis control practices and food safety
New technology of making safe nano material for food packing from natural raw materials.

Key Items of Evaluation

The majority of packaging which provides good quality barriers is made from

synthetic plastics thus when disposed has an environmental impact and in addition, might have an effect on human health. The project defined gives an alternative to plastic wrapping.