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	15%	15%	15%	15%
502	New and Improved Food Products	10%	10%	10%	10%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	60%	60%	60%	60%
903	Communication, Education, and Information Delivery	15%	15%	15%	15%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	7.8	3.6	3.9	2.0
Actual	1.1	0.9	3.9	0.9

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	3215	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
16665	0	290347	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research efforts involve using high pressure processing to reduce bacteria, viruses, protozoan oocysts, and bacterial endospores; inactivation of pathogenicbacterial specieswith high pressure and mild heat; using various antimicrobial films to control bacteria, such as Listeria monocytogenes;physiological and genetic analysis ofpressure-resistant Listeria monocytogenes; testing of activity of antimicrobial films against native and inoculated bacteria on foods and surfaces; effects and mechanisms of non-thermal processes (ozone, UV, oxidative chemicals, iron, and/or high pressure processing) on protozoa, human pathogenic viruses, and bacteriophage, and increase understanding of basic biochemistry of these microorganisms. Extension efforts include conducting Keep Food Safe, ServSafe®, Don't Give Kids a Tummy Ache, Food Safety for Entrepreneurs, Keep'em Down on the Farm, Chances and Choices, Operation Risk, Microbial Contamination, Don't Bug Me!,; training volunteers including Master Food Educators, 4-H leaders, agency personnel, and teacher about food safety so that they can educate families, community groups, and institutions (e.g., childcare centers, schools); developing and delivering programs on Kids Cooking (1890 EFNEP), Food Safety for Youth, and Eat Smart, Play Hard; developing web-based information and fact sheets; distributing information to media; developing a marketing campaign to expand program participation; developing a marketing strategy with state and local government partners, faith-based groups, parents, social workers, childcare providers, low income housing managers, and corporate wellness centers to collectively deal with low income and socially disadvantaged individuals.

2. Brief description of the target audience

Restaurant workers, volunteer food handlers, delicatessen workers, day care providers, institutional foodservice workers, school foodservice personnel, caterers/private chefs, food entrepreneurs, retail food owners/managers, food producers, youth ages 5 to 18, parents and caregivers of children from birth to 18, limited-resource individuals and families, 4-H leaders and clubs, Boys and Girls clubs, teachers and other school personnel, youth in low-income schools, policy makers, and media.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	3290	46855	7450	7900
Actual	3290	46855	7450	7900

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

Patent Applications Submitted

Year:	2010
Plan:	0
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	1	7	
Actual	1	20	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Competitive Grants Submitted

Year	Target	Actual
2010	8	33

Output #2

Output Measure

- Number of Competitive Grants Awarded

Year	Target	Actual
2010	3	14

Output #3

Output Measure

- Number of Research Projects Completed

Year	Target	Actual
2010	5	9

Output #4

Output Measure

- Number of Undergraduate Researchers

Year	Target	Actual
2010	4	20

Output #5

Output Measure

- Number of M.S. Graduate Students

Year	Target	Actual
2010	5	21

Output #6

Output Measure

- Number of Post-doctoral Research Associates

Year	Target	Actual
2010	2	2

Output #7

Output Measure

- Number of Refereed Journal Articles

Year	Target	Actual
2010	8	21

Output #8

Output Measure

- Number of Books and Book Chapters

Year	Target	Actual
2010	2	4

Output #9

Output Measure

- Number of Technical Reports

Year	Target	Actual
2010	2	11

Output #10

Output Measure

- Number of Extension Bulletins and Factsheets

Year	Target	Actual
2010	14	4

Output #11

Output Measure

- Number of Invited Presentations

Year	Target	Actual
2010	4	18

Output #12

Output Measure

- Number of Volunteered Presentations

Year	Target	Actual
2010	12	47

Output #13

Output Measure

- Number of Websites Established

Year	Target	Actual
2010	0	1

Output #14

Output Measure

- Number of Workshops Conducted

Year	Target	Actual
2010	235	262

Output #15

Output Measure

- Number of Newsletters Distributed

Year	Target	Actual
2010	35000	2222

Output #16

Output Measure

- Number of New Program Partners
  Not reporting on this Output for this Annual Report

Output #17

Output Measure

- Number of Ph.D. Graduate Students

Year	Target	Actual

2010	0	5

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increased number of farmers, processors, food handlers, and families who are aware of food safety and nutrition issues that can lead to illness and long-term health problems and of the practices and technologies needed to ensure a safe and healthy food supply.
2	Educational programs for K-12 youth and teachers on food safety and nutrition that will help reduce the likelihood of food-borne illness, develop good nutritional and dietary habits, avoid obesity, and prevent chronic illnesses related to poor nutrition.
3	Increased number of farmers and food processors adopting research-based advances in food science technology that will prevent the incidence and spread of foodborne illnesses.
4	Safe, new food products that are preserved using innovative technologies designed to maintain food quality and nutrient content.
5	Increased number of program participants improving in one or more safe handling practices.
6	Increased number of participating youth increasing understanding of safe food handling procedures.
7	Increased number of program participants improving one or more nutrition practices.
8	Increased number of program participants improving one or more food resource management practices.
9	Increased number of program participants increasing or maintaining appropriate physical activity level.
10	Food science and technology: basic and applied research will lead to optimization of intervention strategies incorporating high hydrostatic pressure processing, ultraviolet light, ozone treatment, active packaging and low-temperature storage to eliminate or significantly reduce the source of foodborne disease in food products. Applied food science research and extension programs in these areas will increase awareness to food producers and consumers of the most effective strategies for food product safety.
11	Food safety: research and extension programs will lead to enhanced safety and wholesomeness of foods as a result of improved understanding of the mechanisms whereby food pathogens exist, enter, survive, propagate and actuate disease syndromes in individuals who consume contaminated products. Gene-based methods to rapidly and accurately identify food-borne pathogens will increase the safety of food products.

Outcome #1

1. Outcome Measures

Increased number of farmers, processors, food handlers, and families who are aware of food safety and nutrition issues that can lead to illness and long-term health problems and of the practices and technologies needed to ensure a safe and healthy food supply.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Food Service industry personnel and their employers

What has been done
Educational programs targeted at food safety training for food service personnel.

Results
Eighty-eight clients employed in the food service industry took the Servsafe certification course. Of those who took the course, 83 were successful in passing the certification exam.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
903	Communication, Education, and Information Delivery

Outcome #2

1. Outcome Measures

Educational programs for K-12 youth and teachers on food safety and nutrition that will help reduce the likelihood of food-borne illness, develop good nutritional and dietary habits, avoid obesity, and prevent chronic illnesses related to poor nutrition.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Public, families, youth, food service personnel, and K-12 teachers.

What has been done
With recent outbreaks involving common foods such as eggs, peanut butter, spinach, and tomatoes, UD food science experts developed traditional and interactive materials about foodborne illness outbreaks that could be integrated into high school curriculums to teach students the science of this current ?hot? topic.

Results
Nineteen middle school, high school and college-level teachers attended a conference hosted UD to introduce the educational materials. The teachers came from backgrounds of biology, chemistry, microbiology, family and consumer sciences, applied physical sciences and mathematics. There are aspects of the program that are a perfect fit for biology and chemistry teachers, but there are also aspects that are appropriate for consumer sciences and more traditional agricultural courses. Materials available for the teachers include a presentation on food microbiology, outbreak investigation case studies and interactive web-based games. The web activities can be used by one player or groups of students in the classroom.

4. Associated Knowledge Areas

KA Code	Knowledge Area
903	Communication, Education, and Information Delivery

Outcome #3

1. Outcome Measures

Increased number of farmers and food processors adopting research-based advances in food science technology that will prevent the incidence and spread of foodborne illnesses.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
903	Communication, Education, and Information Delivery

Outcome #4

1. Outcome Measures

Safe, new food products that are preserved using innovative technologies designed to maintain food quality and nutrient content.

2. Associated Institution Types

- 1862 Research
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
903	Communication, Education, and Information Delivery

Outcome #5

1. Outcome Measures

Increased number of program participants improving in one or more safe handling practices.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Public, food service industry, state and federal agencies concerned about foodborne illness, and the public.

What has been done
A Master Food Educators (MFE) program, modeled after the nationally successful Master Gardeners program, has been established and volunteers trained by Cooperative Extension.

Results
These dedicated MFE volunteers gave over 240 volunteer hours of their time back to UD extension. Volunteers conducted workshops in the community such as Eating Local or The Good, Bad and Ugly on Eating Fats, staffed educational displays at Ag Day, Day on the Farm and school health fairs, and conducted food preparation demonstrations at Dining with Diabetes and Eat Smart for a Healthy Heart programs conducted by the FCS agents.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
903	Communication, Education, and Information Delivery

Outcome #6

1. Outcome Measures

Increased number of participating youth increasing understanding of safe food handling procedures.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
903	Communication, Education, and Information Delivery

Outcome #7

1. **Outcome Measures**

Increased number of program participants improving one or more nutrition practices.

Not Reporting on this Outcome Measure

Outcome #8

1. **Outcome Measures**

Increased number of program participants improving one or more food resource management practices.

Not Reporting on this Outcome Measure

Outcome #9

1. **Outcome Measures**

Increased number of program participants increasing or maintaining appropriate physical activity level.

Not Reporting on this Outcome Measure

Outcome #10

1. **Outcome Measures**

Food science and technology: basic and applied research will lead to optimization of intervention strategies incorporating high hydrostatic pressure processing, ultraviolet light, ozone treatment, active packaging and low-temperature storage to eliminate or significantly reduce the source of foodborne disease in food products. Applied food science research and extension programs in these areas will increase awareness to food producers and consumers of the most effective strategies for food product safety.

2. **Associated Institution Types**

- 1862 Research
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual

2010	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
US food production and distriubtion industry, state and federal agencies concerned about foodborne illness, the public.

What has been done
Food safety research at UD is extensive and ranges from factors affecting pathogen survival in fresh and processed foods and innovative processing techniques that ensure a safe food supply.

Results
Research at UD examines pathogen transmission in the environment?from the gut of a chicken, into the soil, into a plant, through processing to the consumer. Food scientists at UD are evaluating survival on plants for pre-harvest safety and post-harvest are evaluating herbal-oils that could be used to kill the bacteria before the fresh tomatoes reach the consumer. In addition to research in the area of environmental transmission, UD scientists are working with high pressure processing techniques and mild heat treatments to enhance the safety and packaging components of our food supply and completely kill pathogenic bacteria on sprouting seeds with minimal negative impact on the seeds in a non-chemical fashion. High pressure processing research at UD is also studied to kill pathogenic bacteria and viruses often linked with human illness from raw oyster consumption. Scientists at UD are also enhancing the safety of compost applied to crops ensuring inactivation of bacteria and viruses. Scientists are working with to understand how spores of related species like Bacillus anthracis and Bacillus cereus survive food processing treatments. Research has also investigated how cyclospora interact with raspberries and not others and how the organism may be inactivated by non-thermal technologies.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #11

1. Outcome Measures

Food safety: research and extension programs will lead to enhanced safety and wholesomeness of foods as a result of improved understanding of the mechanisms whereby food pathogens exist, enter, survive, propagate and actuate disease syndromes in individuals who consume contaminated products. Gene-based methods to rapidly and accurately identify food-borne pathogens will increase the safety of food products.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
903	Communication, Education, and Information Delivery

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}