

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Food Safety

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies	15%	15%	40%	40%
502	New and Improved Food Products	10%	10%	15%	15%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	60%	60%	40%	40%
903	Communication, Education, and Information Delivery	15%	15%	5%	5%
	Total	100%	100%	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	1.2	2.1	3.9	1.1
Actual Paid Professional	1.2	2.3	4.9	0.6
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
21696	61862	4533	108700
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	61862	0	108700
1862 All Other	1890 All Other	1862 All Other	1890 All Other
634766	147000	1626193	319998

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 pathogenic bacterial species with high pressure and mild heat; using various antimicrobial films to control bacteria, such as *Listeria monocytogenes*; physiological and genetic analysis of pressure-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 DineSafe, ServSafe®, Don't Give Kids a Tummy Ache, Food Safety for Entrepreneurs, GAP/GHP training, Don't Bug Me!, FoodSkills, Expanded Food and Nutrition Education workshops, 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 reach a variety of audiences.

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.

3. How was eXtension used?

Not reporting this year.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3180	2060	4166	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	2	22	24

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Competitive Grants Submitted

Year	Actual
2012	22

Output #2

Output Measure

- Number of Competitive Grants Awarded

Year	Actual
2012	8

Output #3

Output Measure

- Number of Research Projects Completed

Year	Actual
2012	11

Output #4

Output Measure

- Number of Undergraduate Researchers

Year	Actual
2012	13

Output #5

Output Measure

- Number of M.S. Graduate Students

Year	Actual
2012	9

Output #6

Output Measure

- Number of Post-doctoral Research Associates

Year	Actual
2012	2

Output #7

Output Measure

- Number of Refereed Journal Articles

Year	Actual
2012	24

Output #8

Output Measure

- Number of Books and Book Chapters

Year	Actual
2012	1

Output #9

Output Measure

- Number of Technical Reports

Year	Actual
2012	3

Output #10

Output Measure

- Number of Extension Bulletins and Factsheets

Year	Actual
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2012 4

Output #11

Output Measure

- Number of Invited Presentations

Year	Actual
2012	24

Output #12

Output Measure

- Number of Volunteered Presentations

Year	Actual
2012	25

Output #13

Output Measure

- Number of Websites Established

Year	Actual
2012	3

Output #14

Output Measure

- Number of Workshops Conducted

Year	Actual
2012	360

Output #15

Output Measure

- Number of Newsletters

Year	Actual
2012	405

Output #16

Output Measure

- Number of Ph.D. Graduate Students

Year	Actual
2012	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 that will help reduce the likelihood of food-borne illness.
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	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.
8	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	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Consumers report increasing discomfort in the kitchen with food preparation and skills.

What has been done

UD Extension has developed a Master Food Educator program, where trained volunteers offer programs for consumers.

Results

MFE volunteers reached over 250 adults and youth by staffing educational displays, conducting workshops and demonstrating healthy food recipes. They worked to develop an educational series for adults who just don't know how to cook and entitled it "Clueless in the Kitchen". Twelve individuals attended and they learned knife skills, quick cooking techniques and how to read and complete recipes. They learned about stir-fry cooking, pasta sauces, and cooking cuts of beef effectively. They all had the chance to practice cooking foods under the guidance of MFE volunteers. All indicated that they learned skills that they will use in the future.

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 that will help reduce the likelihood of food-borne illness.

Not Reporting on this Outcome Measure

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	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is a need in Delaware to address the increasing concerns over food safety of produce and to help growers meet buyer demands for food safety.

What has been done

A team of agricultural and family and consumer science educators delivered an educational program targeting commercial fruit and vegetable growers in Delaware. Delaware growers attended a two-part voluntary Good Agriculture Practices/Good Handling Practices (GAP/GHP) training. Classes consisted of the rationale behind food safety strategies, tactics for implementing GAPs and GHPs, what an audit would look like, how to implement GAP/GHP, information about on-farm worker training, and developing a food safety plan for the operation.

Results

Six-month post and final program surveys were sent to 156 participants who completed training. Of the 70 respondents returning the six-month survey, 90 percent reported being better able to manage risks as they relate to farm food safety and 95 percent better understand their role in preventing foodborne illness. Over 430 farm workers were trained by operators, 23 mock audits

were conducted by operators/consultants, and 18 percent completed a farm safety plan. In 2011, an additional 58 producers, 20 larger wholesale, and 38 smaller growers participated in 6-hour and 3-hour training sessions, respectively. Two farms had GAP/GHP audits, and assistance was provided in writing three produce food safety plans in 2011.

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	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Regulators, farmers, packers and others along the supply chain need the scientific and technological knowledge needed to develop and defend produce safety protocols, or ?metrics? as the industry calls them.

What has been done

Kali Kniel and Kathyne Everts from the University of Delaware are participating in a project that is focused on increasing produce safety and delivering more trustworthy salad fixings. The three-year study promises to be one of the most comprehensive studies of fresh produce safety ever conducted.

Results

The project will involve extensive testing and data collection by industry, supplemented by field experiments involving eight other university and federal laboratories around the country.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
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	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Professional food handlers require professional training and certification in the handling and serving of foods.

What has been done

University of Delaware Cooperative Extension has two programs that target quantity food handlers. The ServSafe® program is the premiere food safety certification offered by the National Restaurant Association Educational Foundation. This program is designed for managers of

foodservice operations. Successful completion of the certification exam helps in meeting Delaware Food Code requirements. Dine Safe is designed for quantity food preparers working in a variety of settings, including restaurants, fire halls, churches, and child care centers. They learn skills and strategies required to keep food safe, regardless of their specific job.

Results

During the last two years, University of Delaware Cooperative Extension has reached over 350 quantity foodservice workers in both the ServSafe® and Dine Safe programs. As a result of the program, 86 percent passed the ServSafe® certification examination. Additionally, participants indicated that they would personally, or have their staff, wash hands more frequently (89%), improve personal hygiene (70%), calibrate thermometers on a regular basis (80%), keep foods above 140°F (74%), cool foods more rapidly (68%), use sanitizers correctly (71%), and thoroughly wash and sanitize work surfaces (81%). Likewise, Dine Safe participants indicated that they would improve food safety practices with 87 percent reporting the intent to wash hands more frequently, 71 percent keeping foods hot and cooling food rapidly, and 76 percent thoroughly washing and sanitizing work surfaces before preparing food.

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.

Not Reporting on this Outcome Measure

Outcome #7

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 Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

E. coli bacteria (STEC) poses a serious threat to the food supply, resulting in more than 265,000 infections in the United States each year.

What has been done

K. Eric Wommack, professor of environmental microbiology in the Department of Plant and Soil Sciences at the University of Delaware, is part of a five-year study aimed at preventing potentially fatal illnesses linked to Shiga toxin-producing E. coli bacteria (STEC) in the nation's food supply. The coast-to-coast study includes a team of 48 investigators from multiple universities and government agencies, with the University of Nebraska and Kansas State University as the lead institutions. For this study, Wommack will examine the microbial communities that form around STEC to see if there is a pattern that scientists can pinpoint.

Results

This would allow the researchers to trace non-toxic levels of STEC by determining the kinds of microbial communities where it is most likely to occur.

4. Associated Knowledge Areas

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

Outcome #8

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.

Not Reporting on this Outcome Measure

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)

Evaluation Results

tbd

Key Items of Evaluation

tbd