

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: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	1.5	2.5	4.0	1.5
Actual Paid Professional	0.9	1.9	4.9	1.2
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
18176	88197	8418	286657
1862 Matching	1890 Matching	1862 Matching	1890 Matching
29709	88197	0	286657
1862 All Other	1890 All Other	1862 All Other	1890 All Other
416568	150496	1327311	145884

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?

In 2013 UD and DSU eXtension Institutional Team comprised of faculty and staff from across all planned program areas completed the following:

- Training on how to incorporate eXtension into grants
- Connected the Extension website with eXtension.org
- Implemented Ask an Expert throughout the state. Staff and faculty engaged in the eXtension Learn feature
- Faculty and staff increased participation in the Communities of Practice (COP)-DE is represented by 81 eXtension members in 43 of the 73 approved CoP
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We trained 40 "experts" to use the Ask an Expert system and have fielded over 295 questions in the past 9 months. (84% of those questions were answered by Delaware experts). For Planned Program #5, eXtension "Ask an Expert" serves as a great connector to public requests for information. Over 5% of the Ask an Expert questions received in Delaware are related to food and food safety.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3854	858	3522	0

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	1	24	25

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Competitive Grants Submitted

Year	Actual
2013	25

Output #2

Output Measure

- Number of Competitive Grants Awarded

Year	Actual
2013	9

Output #3

Output Measure

- Number of Research Projects Completed

Year	Actual
2013	10

Output #4

Output Measure

- Number of Undergraduate Researchers

Year	Actual
2013	13

Output #5

Output Measure

- Number of M.S. Graduate Students

Year	Actual
2013	8

Output #6

Output Measure

- Number of Post-doctoral Research Associates

Year	Actual
2013	2

Output #7

Output Measure

- Number of Refereed Journal Articles

Year	Actual
2013	25

Output #8

Output Measure

- Number of Books and Book Chapters

Year	Actual
2013	3

Output #9

Output Measure

- Number of Technical Reports

Year	Actual
2013	4

Output #10

Output Measure

- Number of Extension Bulletins and Factsheets

Year	Actual
2013	16

Output #11

Output Measure

- Number of Invited Presentations

Year	Actual
2013	32

Output #12

Output Measure

- Number of Volunteered Presentations

Year	Actual
2013	26

Output #13

Output Measure

- Number of Websites Established

Year	Actual
2013	2

Output #14

Output Measure

- Number of Workshops Conducted

Year	Actual
2013	432

Output #15

Output Measure

- Number of Newsletters

Year	Actual
2013	0

Output #16

Output Measure

- Number of Ph.D. Graduate Students

Year	Actual
2013	8

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
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Delaware Farmers want to increase income by marketing and selling wholesome, value-added products that meet the recommended food safety guidelines.

What has been done

A value-added session was held to inform producers of the licensing, procedures and requirements for marketing value-added food products and produce (e.g. through canning). Producers learned the importance of selling products that are safe for consumers and they were introduced to the Food Business Incubator Center at Delaware State University. The Center provided producers with a licensed facility at low cost to make value-added products for commercial production. Producers also attended the SERVSAFE course, which certifies food handlers for five years to process and handle food in a food production facility.

Results

Participants expanded their knowledge of additional resources available through Delaware Department of Agriculture, USDA, and FDA, such as requirements for licenses and permits which authorize the production and selling of value-added products. This acquired knowledge helped producers increase the quantity of value-added products for available markets. More value-added workshops and practical sessions are planned for 2014.

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.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Many youths lack knowledge of proper nutritional information and proper food safety skills.

What has been done

Kitchen Physics After-School Program at William Henry Middle School was designed by DSU Extension educators, in collaboration with the Capital school District, to reinforce nutrition and food safety education in a fun and experiential manner. USDA's MyPlate curriculum was used to reach 122 children who successfully completed the program. Students participated in six workshops and received nutritional information to share with their families at home. In all, 188 factsheets were distributed.

Results

A post survey was conducted and the results suggest that 95 percent of youths were able to identify meals and snacks that fit the MyPlate guidelines, and 90 percent of youths were able to correctly identify six out of six food safety mistakes on a sheet provided. Additionally, 85 percent of youths could identify at least four whole grains; more than 75 percent of youths knew the correct method of hand washing for safe food handling; and 95 percent of youths were willing to try unfamiliar foods and expressed delight at finding they liked them.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
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	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Food workers must be aware that their food handling practices can reduce the risk of developing a foodborne illness. An estimated 48 million Americans experience foodborne illness each year. In addition, about 2 to 3 percent develop some type of long-term health consequence such as Guillain-Barré syndrome, reactive arthritis, or renal problems and about 3,000 die due to food contaminated with harmful microorganisms. The Centers for Disease Control suggests that 70 percent of these outbreaks are due to mishandling in a quantity foodservice establishment.

What has been done

University of Delaware Cooperative Extension has two programs that target quantity food handlers. The ServSafe® program from by the National Restaurant Association Educational Foundation is for managers of foodservice operations. Successful completion of the certification examination helps in meeting Delaware Food Code requirements. DineSafe is for quantity food preparers working in a variety of settings. They learn skills and strategies required to keep food safe regardless of their specific job.

Results

During 2013, 54 quantity foodservice workers were reached in both the ServSafe® and DineSafe programs. These individuals worked in a variety of settings including restaurants, delis, schools, day care, hospital/nursing homes, and volunteer operations such as fire halls and churches. Because of the programs, participants in these two programs indicated that they would improve

food safety practices with:
?88 percent reporting the intent to wash hands more frequently;
?68 percent keeping foods hot;
?69 percent cooling food rapidly;
?74 percent using sanitizer correctly, including checking the concentration; and
?81 percent thoroughly washing and sanitizing work surfaces before preparing a different 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 #4

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

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

Not Reporting on this Outcome Measure

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	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Delaware over the past 30 years, the prevalence of overweight and obesity has increased sharply for both adults and children. According to the CDC report about Delaware, in 2007, 65% of adults in Delaware were overweight or obese and 18 percent of high schools students were overweight, based on self-reported height and weight.

These figures show a great need for the nutrition programs that UD Cooperative Extension has to offer. But with few full-time staff to address the nutrition and wellness concerns of clientele, Cooperative Extension needed to increase its capacity to reach citizens of Delaware.

What has been done

To expand Cooperative Extension's reach, the Master Food Educators program started a trained volunteer program. This year's Master Food Educator Training Program was a 42-hour professional development curriculum offered in Kent and New Castle County via Adobe Connect. The program helps volunteers increase knowledge and confidence about nutrition, food science, wellness, food preparation, and food safety. Community nutrition students and volunteer Dietetic Interns assist in the development of resources to support this.

Results

During the 2013-14 program year, 24 Master Food Educators volunteered to support 17 workshops, 7 public events and assisted in judging 2 events giving just over 800 hours to Cooperative Extensions outreach efforts.

The Master Food Educators reached 1,282 individuals through their workshops and public events appearances.

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

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

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Produce growers, food distribution and sales industries, consumers, state and federal agencies responsible for food safety for fresh market vegetables

What has been done

Research has been conducted on to assess the influence of irrigation water and soil-borne contaminants as a source of food-borne pathogens for leafy greens and tomatoes grown under field conditions.

Results

Field studies have been established to provide data on the presence, viability, and survivability of food-borne pathogens of concern for human health in various irrigation waters, as impacted by the types of soil amendments (e.g., manures, fertilizers, other organic fertilizers) used to grow leafy greens and tomatoes. Results will be used to provide information as new rules are developed for vegetable produces as part of the Food Safety Modernization Act.

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.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nationwide, there are 16 mobile processing units currently in service?eight dedicated to processing poultry and eight for red meat. Only a few of these are USDA certified, and most are not designed for use with more than one type of animal, which means operators must process only poultry or red meat. Prime markets for value-added meat products made in Delaware are Washington D.C., Baltimore, MD, Philadelphia, PA, and New York, NY. In order to market and transport Delaware meat products across state lines, USDA inspection is required.

What has been done

Delaware State University Cooperative Extension?s Mobil Meat Processing Lab was designed as a USDA certified unit to process red meat, poultry and aquacultured fish, making it unique among the 16 mobile processing units currently in operation. To publicize this initiative with clientele and Cooperative Extension peers across the country, the lab was presented during Delaware?s Ag Week 2013 and a poster was created for the Small Farms Conference. Both activities generated a lot of interest in our project.

Results

By working closely with the vendor and in conjunction with the Nomad engineers, the final designs for the MMPL were completed. The unit was delivered to DSU Extension in August 2013.

Now that minor warranty issues have been resolved, a vendor is being selected to provide the processing equipment necessary to render the MMPL usable.

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

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

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluation of the Food Safety planned program for FY13 (6.1 Research FTEs, 2.8 Extension FTEs) shows that an active research program focused on food safety and innovative food processing technologies is well-linked with our extension programs, particularly in food safety and human nutrition. Areas of strength are on the biology of food pathogens, management strategies to prevent contamination of fresh produce by viruses and bacteria, food processing technologies that can ensure food safety, and a wide range of extension programs for families, youth, food handlers, and the food service industry. Evaluations of research and extension productivity showed that 9 grants were awarded, that faculty in this program supported the efforts of 31 graduate students, post-docs, and undergraduate researchers, that they published 25 refereed journal articles and book chapters, made 58 invited and volunteered presentations at national and international meetings, and conducted 432 workshops. Our evaluations have included annual internal administrative reviews and numerous surveys and other evaluation methods conducted with stakeholders participating in workshops and other extension programs. Specific examples of stakeholder evaluation of these programs, particularly by our extension professionals, are provided in the "Outcomes" section of the FY13 annual report. Internal and external reviews of research quality and feedback from stakeholders have been positive and

complimentary of the dedicated efforts of our food safety research and extension team to provide science-based solutions to the many challenging problems related to providing a safe and secure food supply today.

Key Items of Evaluation

There are no major items requiring NIFA attention at this time, other than the continued need for more federal funding for research and extension programs which, while productive, are only addressing a fraction of the growing and very complex problems related to food safety today.