V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Safe and Secure Food Supply for Human Nutrition and Health

☑ 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	5%	5%	5%	5%
703	Nutrition Education and Behavior	25%	25%	25%	25%
704	Nutrition and Hunger in the Population	10%	10%	10%	10%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	20%	20%	20%	20%
723	Hazards to Human Health and Safety	5%	5%	5%	5%
724	Healthy Lifestyle	10%	10%	10%	10%
806	Youth Development	25%	25%	25%	25%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Paid	7.2	6.5	7.8	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**
83004	232213	8968	239255
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
119126	232213	149685	239255
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
773200	307180	1515188	230862

V(D). Planned Program (Activity)

1. Brief description of the Activity

I. Nutrition and Health Promotion
Extension programs will have a nutrition and health focus. The Expanded Food and Nutrition Education Program (EFNEP) and the Supplemental Nutrition Assistance Education Program focus on low income adults and children. Nutrition education programs for the broader population will include Dining with Diabetes and Eat Smart for a Healthy Heart. Delaware will fully invest in the youth mandate area of healthy living by preparing youth for healthy lifestyle choices in nutrition and physical activities. Additional health approaches will include drug and alcohol prevention, and bullying and suicide prevention. Curricula will include Health Rocks, Up for the Challenge, and Food Smart Families. Master Food Educator Volunteers and trained adult volunteers and teen mentors will participate in program delivery.

II. Food Safety
Research efforts involve 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.

III. Healthy Living
This is a new interdisciplinary focus on health beyond nutrition education. Research will explore the "One Health" concept and the contribution of plant, animal and ecosystem health to human health. Extension efforts will dovetail with the Cooperative Extension National Framework for Health approved by ECOP in spring 2014. The Delaware Extension program will focus on the topics of health literacy, chronic disease prevention and management, positive youth development for health, and integrated nutrition, health, environment, agriculture systems. This programmatic effort will highlight some new partnerships including the College of Health Sciences and the DE Department of Health.

2. Brief description of the target audience

Adults, youth, particularly low income adults and youth, 4-H adult and teen volunteers, as well as Master Food Educators are the primary target audiences for the Extension programs. Community groups and

health organizations will be another audience but also partners in outreach efforts.

3. How was eXtension used?

In 2014 the eXtension Institutional Team comprised of faculty and staff from across all planned program areas continue to provide the leadership for this work. This past year the team has focused on the following:

- Developing a strategic plan for use of social media (created by eXtension Fellow)
- Implementing social media strategic plan- including two social media campaigns
- Additional training and implementation on Ask an Expert
- On-line course development
- Became a premier member of new eXtension structure

The social media strategy particularly focused on safe and secure food supply issues during targeted holiday seasons as well as during food preservation time.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	32208	94224	38119	8349

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

Patent Applications Submitted

Year: 2014

Actual: 1

Patents listed

need patent info

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	53	53

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Competitive Grants Awarded

Year	Actual
2014	23

Output #2

Output Measure

- Undergraduate Researchers

Year	Actual
2014	70

Output #3

Output Measure

- M.S. and Ph.D. Students

Year	Actual
2014	58

Output #4

Output Measure

- Post-doctoral Research Associates

Year	Actual
2014	10

Output #5

Output Measure

- Refereed Journal Articles

Year	Actual
2014	53

Output #6

Output Measure

- Books and Book Chapters

Year	Actual
2014	8

Output #7

Output Measure

- Extension Bulletins and Fact Sheets

Year	Actual
2014	1612

Output #8

Output Measure

- Webpage views/downloads

Year	Actual
2014	60689

Output #9

Output Measure

- Workshops at State, National, and International Level

Year	Actual
2014	2137

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	1. Nutrition and Health: Increases in the knowledge, skills and plans to adopt and/or adoption of healthful diet practices and/or physical activity.
2	2. Food Safety: Increases in the knowledge, skills and plans to adopt better food safety/food handling practices. The number of people certified in safe food handling practices. Basic and applied research 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.
3	3. Healthy Living: Increases in the knowledge, skills and plans to adopt and/or adoption of health literacy and chronic disease management and prevention skills. Increases in the knowledge, skills and plans to adopt and/or adoption of practices to prevent accidents and injuries. Increases in the knowledge, skills and plans to adopt and/or adoption of practices to prevent bullying and suicides. Increases in the knowledge, skills and plans to adopt and/or adoption of positive behaviors regarding health and legal risks of using tobacco, drugs, and alcohol.

Outcome #1

1. Outcome Measures

1. Nutrition and Health: Increases in the knowledge, skills and plans to adopt and/or adoption of healthful diet practices and/or physical activity.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	12365

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As of 2013, about 11 percent of the Delaware population reported having been diagnosed with diabetes, and this number has been steadily increasing, keeping pace with the increasing rate of pre-diabetes and diabetes in the country. There is a need for more diabetes education in Delaware, as only 49 percent of those diagnosed with diabetes have taken a class about managing their diabetes and diabetes is the sixth leading cause of death in the state.

What has been done
Dining with Diabetes consists of three classes that provide diabetes education, cooking demonstrations and tasting of healthy foods. Participants learn how to reduce sugar, salt, and fat without giving up taste. The first class focuses on desserts, the second class focuses on main dishes, and the last class focuses on side dishes. After each lesson the participant takes home recipes and diabetes resources, as well as knowledge on how they can manage their diabetes on a daily basis.

Results
In 2014, a total of 34 individuals enrolled in the Dining with Diabetes workshop series held once in the spring and once in summer. As a result, attendees reported eating more vegetables (21 percent), eating more fruits (15 percent), reading Nutrition Facts labels (32 percent), reading ingredient labels (29 percent), being more physically active (18 percent), more likely to eat on a regular basis (24 percent), and more likely to eat breakfast (18 percent). Furthermore, planning healthier meals, using different artificial sweeteners, and using better portion control were noted as additional ways to manage their diabetes by 32, 16, and 26 percent of participants, respectively.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
723	Hazards to Human Health and Safety
724	Healthy Lifestyle
806	Youth Development

Outcome #2

1. Outcome Measures

2. Food Safety: Increases in the knowledge, skills and plans to adopt better food safety/food handling practices. The number of people certified in safe food handling practices. Basic and applied research 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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4509

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
A better understanding is needed of the processes that contribute to the microbial contamination of fresh produce.

What has been done
Yan Jin, professor of soil science and an environmental physicist in the Department of Plant and

Soil Sciences, is conducting research that will link crop surface properties, physics of small-scale water organization and subsequent nutrient availability with the attachment, growth and colonization of bacteria.

Results
The research will provide insight to improve risk assessment methods and pathogen control protocols of produce contamination. Researchers will apply their knowledge of colloid/bacteria attachment and transport processes in porous media to understand how microbial pathogens attach and colonize to fruit and vegetable surfaces. Researchers also expect to develop a computational model, which will provide a quantitative and predictive tool for addressing the key biophysical factors influencing bacterial attachment, survival and colonization on fresh produce.

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
723	Hazards to Human Health and Safety
806	Youth Development

Outcome #3

1. Outcome Measures

3. Healthy Living: Increases in the knowledge, skills and plans to adopt and/or adoption of health literacy and chronic disease management and prevention skills. Increases in the knowledge, skills and plans to adopt and/or adoption of practices to prevent accidents and injuries. Increases in the knowledge, skills and plans to adopt and/or adoption of practices to prevent bullying and suicides. Increases in the knowledge, skills and plans to adopt and/or adoption of positive behaviors regarding health and legal risks of using tobacco, drugs, and alcohol.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	13036

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Child Policy Resource Center notes that the obesity rate for Delaware youth ages 10-17 is 33.2% vs. 31.6% nationally, and the level of vigorous activity for youth ages 6-17 in Delaware is 62.7% versus a national rate of 64.3%. Activity rates are lower and obesity is higher in Delaware.

What has been done
Delaware 4-H partnered with EFNEP staff to address the issues around nutritional deficiencies, healthy food choices, and physical activity for 3,000 underserved youth ages 8-12 and their families in rural, suburban, and urban communities in Delaware. EFNEP and 4-H youth collaborated and provided development activities for youth ages 13-19 as co-teachers of the ?Up for the Challenge? curriculum, and for students ages 8-12 as participants. Teens were engaged as educators and leaders.

Results
27% improved response to eat vegetables.
22% improved response to eat fruits.
30% improved response to ask someone to buy low fat milk.
22% improved response to do physical exercise.
69% improved knowledge necessary to choose foods consistent with Federal Dietary Guidelines.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
723	Hazards to Human Health and Safety
724	Healthy Lifestyle
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Public Policy changes
- Government Regulations

Brief Explanation

Food Safety Legislation regarding public eating facilities increased both the demand for programming and the competition to others providing the mandated education

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Research:

• The project in the lab with the greatest direct relevance to the agricultural community has been our work examining the interaction of commensal bacterial communities of cattle with shigella-toxigenic E. coli (STEC). This project is a component of a larger USDA coordinated agricultural project (CAP grant) administered out of the Univ. of Nebraska. This work, done in pre-harvest cattle, seeks to understand the cattle microbiome as on of the myriad factors that may contribute to the prevalence of STEC in the beef food supply chain. STEC strains are responsible for thousands of food-bourne illnesses each year and 10s to 100s of deaths or permanent disabilities. Working with collaborators at the Univ. of Nebraska and Kansas State, we have discovered that STEC infection is correlated with lower bacterial community diversity on cattle hide and within cattle feces. We have also discovered connections between the occurrence of certain bacterial populations and the occurrence of STEC. It is our hope that this fundamental work will one day lead to new technological directions for improving the safety of the beef food supply by mitigating STEC contamination.

• Most people are concerned about the food they eat--how many calories? How much fat?--Yet most people do not think about the toxic compounds they are exposed to through food consumption. Seyfferth's research seeks to understand the soil-food-human pathway of contaminant transport and to devise solutions to this problem in order to decrease the risk to human health. Seyfferth's lab is currently investigating arsenic transport into rice and mitigation technologies using soil incorporation of silica--a non toxic and beneficial element. We have discovered that certain rice residues are capable of decreasing arsenic uptake without exacerbating greenhouse gas emissions. This technology can be adopted by smallholder farmers in developing countries as well as large-scale farmers in developed countries, thereby enhancing food security on a global scale.

• The Delaware Livable Lawns Program has signed up 5 landscape maintenance companies that have committed to following the outlined nutrient management and sustainability practices. An incentive has been funded by DNREC and offered on the website to homeowners who hire Livable Lawn Maintenance companies or perform the practices themselves. Homeowners will be given a $50 gift certificate to purchase native plants at participating retail outlets. This program has been widely publicized through Delaware Gardener columns in the Wilmington News Journal, industry meetings and an active website. This program encourages proper lawn fertilization practices and promotes the use of native plants in the landscape.

• Joerger studied a gene from Salmonella and showed that its product supports Salmonella in surviving highly acidic conditions such as those encountered in the stomach. Knowledge of the components of the gene network responsible for survival of Salmonella in acidic environments is important as it may aid in the development of antimicrobial agents and prevention strategies.

• Food borne illness strikes one in six Americans each year and contamination can originate anywhere along the farm to fork continuum. Research into understanding mechanisms for survival and persistence of pathogenic bacteria and viruses can reduce the number of illnesses each year. Undergraduate and graduate students conduct research to develop scientifically-based metrics for irrigation water standards to reduce pathogen transmission to crops; assess biocontrol measures for sustainable agriculture; and determine virus survival in environmentally-beneficient hydroponic systems.

• Jung-lim Lee, associate professor in the Department of Human Ecology at DSU is conducting research that will rapidly detect and quantify Salmonella and Campylobacter in

poultry egg products using Recombinase Polymerase Amplification (RPA) technique.
The application of the RPA assay will allow for rapid monitoring, detection and quantify Salmonella and Campylobacter in poultry egg products within 30 minutes.
Extension:
Issue: While some sectors in society are rebounding as the U.S. recovers from the recent economic downturn, underserved populations have not been as fortunate. As such, underserved individuals, families and communities in Kent County may require educational efforts to help them make informed choices about food, food safety and food budgeting.
Response: DSU's EFNEP staff presented the Eating Smart and Being Active curriculum (eight lessons) to low-income families in Kent County. Participants met weekly for nutrition education and demonstrations on food safety, food budgeting, nutrition/disease prevention, healthy nutritious meal planning, and fun and fitness. Participants also learned to incorporate physical activity into their lives and received educational incentives upon graduation.
Results:
At 90% graduation rate, the participants completed six weeks of nutrition education and physical activity. Non-graduates were encouraged to complete classes at neighboring sites with a variety of available dates.
Graduates received samples of items from the curriculum to support maintenance of learned knowledge and skills, as well as adoption of healthy behaviors. Items included water bottles, measuring cups and spoons, vegetable scrub, resistant exercise band, handouts of curriculum materials, a cookbook, and a certificate of completion.
Statistical results indicate that 100 percent of participants increased knowledge, 75 percent increased their vegetable intake and 85 percent increased their physical activity. All evaluations can be viewed on the Webneers system.
Issue: Food Smart Families Youth Program for Low-income youth Based on consumption data, we know that many youth are not consuming the recommended amount of vegetables, fruits, and whole grains and are over consuming sweetened beverages and high fat items. Additionally, only 42 percent of children ages 6 to 11 years participate in 60 minutes of physical activity each day.
Response: Each summer, EFNEP paraprofessionals conduct educational programs for low-income youth ages 8 to 12 years old. The 2014 curriculum, 4-H Food Smart Families....Choose Health, featured reducing sweetened beverages; consuming more fruits, vegetables, and whole grains; selecting lower fat fast foods; eating breakfast; and being physically active. To conduct the summer program, EFNEP partnered with University of Delaware 4-H. The teen project was funded by a National 4-H Council ConAgra grant. University of Delaware was one of five national sites selected to pilot the project. Forty-two teens (ages 13 to 18) were trained to assist in delivering the educational programs
Results: Nearly 1,500 youth were engaged in the 4-H Food Smart Families...Choose Health youth program during the summer. They improved their healthy choices by eating more fruits and vegetables (35 and 38 percent, respectively), choosing healthy snacks (42 percent), and eating breakfast (21 percent). , Additionally, 33 percent indicated that they increased their physical activity.
EFNEP staff members were excited to continue using teen mentors to deliver educational programs to low-income children.

Key Items of Evaluation