V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger

☑ 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
102	Soil, Plant, Water, Nutrient Relationships	20%	20%	10%	10%
112	Watershed Protection and Management	10%	10%	5%	5%
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	15%	15%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	5%	5%
205	Plant Management Systems	15%	15%	10%	10%
304	Animal Genome	0%	0%	10%	10%
305	Animal Physiological Processes	0%	0%	5%	5%
307	Animal Management Systems	15%	15%	5%	5%
311	Animal Diseases	10%	10%	15%	15%
601	Economics of Agricultural Production and Farm Management	5%	5%	5%	5%
605	Natural Resource and Environmental Economics	5%	5%	10%	10%
903	Communication, Education, and Information Delivery	20%	20%	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	16.0	4.0	63.3	1.8
Actual Paid Professional	16.6	7.7	64.7	5.1
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**
890476	371563	500306	468947
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
138541	371563	381833	468947
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
746029	405000	1570485	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

For animal agriculture, research and extension programs will target: (1)Poultry Health and Disease Prevention and Control - mechanisms of disease induction, host genetic resistance and immune responses in poultry with a focus on diagnostic surveillance methods, vaccination and biocontainment; (2) Poultry Growth and Development - basic molecular and cellular mechanisms regulating poultry growth, development and meat yield;(3) Avian Genomics - development and application of avian microarrays for: disease diagnosis, resistance, and control; growth and development; and optimization of desired production traits; (4) Alternative Production Systems - alternative production systems to reduce disease, mortality, and waste production, minimize antibiotic use, integrate alternative energy into production systems and foster compatibility between animal production, environmental quality, and urban populations; (5)Nutrient Utilization in Poultry and Ruminants - increased nutrient utilization and reduced nutrient excretion via improved understanding of animal biology. For crop production, key areas are: (1) Agronomic, Vegetable and Horticultural Crop Production - improving varietal selection, disease and pest resistance, seed technology, cultural and marketing practices; (2) New Crops - financial and environmental impacts of new crops or new varieties of existing crops, (3) Integrated Pest Management - control of insect pests, weeds, and plant pathogens via biological, cultural, and chemical methods; (4) New Technologies - improvements in harvesting and guidance systems and expanded research and extension programs on improving the efficiency of irrigation management; implementing recent advances in remote sensing, tillage, and pesticide application; (5) Plant Breeding, Crop Genomics, Proteomics, and Bioinformatics - basic research on how plants adapt to their environments and manage stress and the nature of soil microorganism-plant symbiotic relationships and plant/soil interfacial reactions affecting crop growth and quality; (6) Pasture and Forage Management - research on pasture-based animal production systems and forage research on improving biological control systems for alfalfa. Soil science programs focus on: (1)Fate, Transport, and Reaction Mechanisms of plant nutrients, wastes, and organic chemicals in soils, and their effects on soil, air and water pollution. New soil science research areas include the application of isotope techniques to study how P cycling can be mediated by specific biota under geochemical conditions relevant to critical zone environments. Oxygen isotopes in phosphates (d18Op) will be employed to understand the mechanisms of phosphate uptake and release, sources of P in sediments, and microbial cycling of P. Isotopic signatures of specific pools of mineral bound phosphate and the degree of recalcitrance of the specific P pool to microbial activities will be used study microbial effects on P cycling and elucidate the sources of recalcitrant P phases in the soil environment; (2) Cost-Effective, In-Situ Remediation - cost-effective, in-situ methods for the remediation and speciation of contaminated soils; (3) Nutrient Management for Water, Air, and Soil Quality - fertilizer and waste management programs to ensure economic and environmental sustainability while considering crop needs, nutrient reactions in soils, alternative fertilizer sources, and government policies. New research focuses on understanding the impacts of poultry production on air quality (e.g., emissions of ammonia and

particulate matter from production houses) and engineered methods and management practices to mitigate these deleterious effects. Resource and international economics activity areas include: (1) Protection and Preservation of Agricultural Land - current strategies to protect and preserve agricultural land will be evaluated and promising new approaches will be investigated; (2)International Economics and Trade: improved understanding of factors controlling export-import markets, particularly poultry.

2. Brief description of the target audience

For animal agriculture, primarily poultry integrators, growers, breeders, trade groups and allied industries; dairy and beef producers; livestock commodity groups; forage producers, equine owners, producers and interest groups; state and federal agencies; federal research laboratories; peer scientists in the U.S. and international colleagues, K12 teachers, and environmental and community groups.. For our resource economic programs the audience includes farmers, landowners, state agencies (Delaware Development Office; Land Use Planning and Preservation; Department of Agriculture; Department of Health and Human Services; Department of Natural Resources & Environmental Control; Department of Transportation; Economic Development Office), federal agencies (USDA, NRCS, USEPA), land use organizations (Conservation Districts, AFT), environmental organizations, business and community leaders, families, students, and the general public.

3. How was eXtension used?

In 2012, UD kicked off its eXtension Instiutional Team, comprised of 8 leaders across all planned programs. Those team members set goals for the following:

- Incorporating eXtension into grants;
- Connecting the UD Extension website with eXtension.org;
- Establishing an Ask an Expert widget for Delaware;
- Encouraging the use of eXtension's Learn feature;
- Encouraging a positive culture regarding eXtension;
- Maintaining an accurate list of institutional members in the eXtension people database; and
- Encouraging participation in Communities of practice.

For Planned Program #1, UD's Dr. Carissa Wickens, assistant professor of animal sciences and Extension equine specialist, is an active member of MyHorseUniversity and the cross programs (HorseQuest) with eXtension. She serves as an equine expert for the equine Ask an Expert community and provides resources to the horse pages.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	36867	174310	13040	175

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	5	45	50

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Competitive Grants Submitted

Year	Actual
2012	65

Output #2

Output Measure

- Number of Competitive Grants Awarded

Year	Actual
2012	35

Output #3

Output Measure

- Number of Research Projects Completed

Year	Actual
2012	86

Output #4

Output Measure

- Number of Undergraduate Researchers

Year	Actual
2012	92

Output #5

Output Measure

- Number of M.S. Graduate Students

Year	Actual
2012	32

Output #6

Output Measure

- Number of Ph.D. Graduate Students

Year	Actual
2012	19

Output #7

Output Measure

- Number of Post-Doctoral Research Associates

Year	Actual
2012	5

Output #8

Output Measure

- Number of Refereed Journal Articles

Year	Actual
2012	50

Output #9

Output Measure

- Number of Books and Book Chapters

Year	Actual
2012	6

Output #10

Output Measure

- Number of Technical Reports

Year	Actual

2012	260

Output #11

Output Measure

- Number of Extension Bulletins and Factsheets

Year	Actual
2012	79

Output #12

Output Measure

- Number of Invited Presentations

Year	Actual
2012	146

Output #13

Output Measure

- Number of Volunteered Presentations

Year	Actual
2012	125

Output #14

Output Measure

- Number of Websites Established

Year	Actual
2012	13

Output #15

Output Measure

- Number of Workshops Conducted

Year	Actual
2012	216

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increased number of poultry producers participating in surveillance, diagnostic testing, and vaccination programs for infectious avian diseases. Implementation of statewide plans to address major outbreaks of avian diseases and an increase in the number of diagnostic laboratories using advances in avian genomics to rapidly diagnose infectious diseases.
2	Sustainable production practices for the dairy and beef industries that link forage and pasture production practices with animal health, performance, and meat and milk quality.
3	Increased number of poultry and dairy farmers using feed management practices that increase nutrient utilization and feeding diets with lower concentrations of nitrogen and phosphorus.
4	Increased use of air quality best management practices that prevent odor, ammonia, and particulate emissions from poultry farms.
5	Cost-effective solar power technology to heat and cool poultry houses will allow farmers to reduce their reliance on natural gas, oil, and purchased electricity, increasing the energy efficiency of poultry production.
6	Increased number of farmers adopting new crop varieties and high value, niche market crops, (culinary herbs, spices and essential oils). Integrating innovations in cultural practices, biological and chemical pest management, harvesting equipment, and irrigation management into these systems, including feasibility studies of greenhouses to produce high value plants, such as those intended for pharmaceutical or nutriceutical uses.
7	Increase in the number of farmers and others (e.g., the "Green Industry" - greenhouses, nurseries, landscapers) implementing comprehensive nutrient management and conservation plans that are profitable and protective of ground and surface water quality, build soil quality, prevent soil erosion, and protect natural resource areas.
8	Increased use of soil management programs and best management practices for agricultural, natural, suburban/urban, and disturbed or contaminated settings that incorporate latest advances in research and greater adoption of watershed scale modeling to predict changes in the functions and environmental impacts of soils in mixed-used watersheds (agriculture, suburban, urban, forests) as land use changes from agricultural to suburban and urban uses.
9	Improved economic competitiveness of Delaware agriculture relative to other regions in the U.S. and global competitors with an emphasis on greater adoption of new innovations in marketing and risk management for farmers who must increasingly compete globally.
10	Increased interactions and long-range strategic planning efforts between research and extension staff and the diverse stakeholders (state and federal agencies, community groups, not-for-profit organizations, developers, farmers, etc.) involved in farmland preservation and land use conversion from agriculture to suburban and urban uses.
11	Disease Prevention and Control: basic and applied research on mechanisms of poultry disease will translate into useable tools and strategies for improved disease surveillance, diagnosis, prevention, and control in broiler chicken production. Knowledge will be extended to commercial poultry and allied industries.
12	Animal Genomics: increased understanding of gene function and expression and targeting of candidate genes affecting economically important traits in broiler chicken growth and production, disease resistance and immunity. Improvements in classical poultry breeding programs by use of marker assisted selection (MAS) and technology transfer.
13	Animal Nutrition: research will lead to improved understanding of nutritional requirements for poultry and ruminants and adoption of recommended dietary strategies by practicing

	nutritionists and producers. Specifically, results of poultry directed research aim to minimize nutrient contamination of the environment from manure. Results from ruminant based research will lead to improved management of forages to maximize nutritional value, safe use, and minimize spoilage during storage. Nutritional effects on dairy cattle health and immune function including factors impacting white blood cell gene expression will be studied. Research will also lead to improved understanding of the molecular and cellular mechanisms associated with bovine lameness and early detection of the disease
14	Environmental Compatibility of Animal Agriculture: In addition to addressing nutrient related problems, research and extension programs will develop long-term strategies and management practices for other environmental issues related to animal agriculture such as the fate and transport of trace elements; concerns about air quality with ammonia, hydrogen sulfide, volatile organic compounds, and fine particulates originating from poultry houses; environmental and human health impacts of endocrine disruptors (estrogen, testosterone) found in manures; fate and transport of viruses and other pathogens during disease outbreaks and subsequent disposal of poultry mortality, and potential environmental and human health effects of antibiotics.
15	Plant Biology and Crop Production: basic research will lead to improved understanding of plant molecular biology and allow genetic manipulation of physiological processes important to increasing crop yields and quality and crop resistance to biotic and abiotic stresses. Applied research and extension programs on cultural practices, crop varieties, fertilizer and manure use, precision agriculture, and integrated pest management will increase crop yields, minimize costs, and protect environmental quality. Extension programs will guide management practices for horticultural plants for the "Green Industry" and for homeowners, important because of the rapid conversion of farmland to urban and suburban uses.
16	New Markets: advances in plant molecular biology and genomics will provide new markets for farmers and commercial-scale horticulture, such as plants for bioenergy, pharmaceutical and nutriceutical uses. New and creative marketing programs will stimulate diversification and growth in the production of value-added and niche market crops, such as culinary herbs, spices, essential oil plants, and specialty vegetables for urban and suburban markets.
17	Land Use Change: research will identify strategies needed to manage land use change in a state where preserving farmland is a major goal, but economic and social forces are resulting in steady conversion of agricultural lands to suburban and urban uses. The economic, social, and cultural impacts of land fragmentation, suburban sprawl, and the "critical mass" of land and businesses needed to sustain agriculture in the long-term will be determined. Research knowledge and extension programs will guide long-term land use planning in cooperation with state and local agencies and governments, community groups, and other stakeholders
18	International Economics and Trade: research will provide strategies to foster international trade and economic growth in developed and developing countries, with an emphasis on policy issues related to agricultural and energy markets and climate change, particularly those related to poultry production and bioenergy crops. Extension programs will educate agricultural producers on international marketing strategies for traditional agricultural products (e.g., poultry, grain crops) as well as new cropping systems, such as organic agriculture and genetically modified crops.
19	Educational programs for K-12 teachers and youth on: (i) advances in animal and plant molecular biology and applications of the basic animal and plant sciences to the production of animals and of plants used for food, fiber, landscaping, timber, bioenergy, and pharmaceutical and nutriceutical purposes; (ii) value of soils as a critical natural resource vital to civilization, including the many functions of soils in agricultural and natural ecosystems, the importance of soil management to environmental quality, and the role of soils in sustaining aesthetically pleasing managed landscapes in suburban and urban settings; and (iii) the relationship between land use and major societal issues, such as economic development, community and family adaptation to changing social and political conditions, and the value of

	sustaining ecosystems and protecting environmental quality.
20	Soils and Environment: basic research will increase understanding of physical, chemical, and biological factors influencing the fate and transport of nutrients, metals, organics, and pathogens in soils. Applied research will lead to development of nutrient management strategies and recommendations that minimize nonpoint nutrient pollution from all land uses. Remediation practices for soils contaminated by metals, organics, and nutrients will use innovative, research-based measures to prioritize risk to the environment and human health based on the speciation, mobility, and bioavailability of contaminants in soils. Mitigation approaches for polluted soils will combine soil chemistry, physics, and soil/plant molecular biology to enhance removal or in-situ degradation or stabilization of pollutants in soils.

Outcome #1

1. **Outcome Measures**

   Increased number of poultry producers participating in surveillance, diagnostic testing, and vaccination programs for infectious avian diseases. Implementation of statewide plans to address major outbreaks of avian diseases and an increase in the number of diagnostic laboratories using advances in avian genomics to rapidly diagnose infectious diseases.

   Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

   Sustainable production practices for the dairy and beef industries that link forage and pasture production practices with animal health, performance, and meat and milk quality.

   Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

   Increased number of poultry and dairy farmers using feed management practices that increase nutrient utilization and feeding diets with lower concentrations of nitrogen and phosphorus.

   Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

   Increased use of air quality best management practices that prevent odor, ammonia, and particulate emissions from poultry farms.

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)
The Delmarva Poultry Industry has requested the support of Delaware Extension for ventilation, health and littler management for growers and flock supervisors.

What has been done
Multiple educational workshops were hosted by UD. The UD Poultry Team consisting of Dr. Dan Bautista, Steve Collier from the Lasher Lab staff and Bill Brown, poultry extension agent, with technical support from Dr. Hong Li of the Department of Animal and Food Sciences, produced a series of hot and cold weather ventilation seminars. Many of these sessions were approved by the Delaware Nutrient Management Program, Sydney Riggi, for continuing education credits. These seminars were used in flock supervisor and grower trainings in the spring, fall and early winter and impacted 100?s of industry personnel the majority of which were contract growers.

Results
One company has seen a 20% improvement in ventilation audits. Two companies have changed timing of total cleanout practices. Hygrometers are used in 70% of grow out houses for one integrator. New Housing building programs now require actuated ceiling vents to take better advantage of attic heat and to improve litter and bird quality. One company is utilizing ammonia guns and tubes on 100 % of contract farms. One company is using air mixing tape to better evaluate minimum ventilation. All companies are utilizing the ?static Pressure test? to identify problem housing. One company paid to have training DVD?s produced of our training sessions. Many growers received continuing education credits for nutrient management compliance.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
307	Animal Management Systems
605	Natural Resource and Environmental Economics
903	Communication, Education, and Information Delivery

Outcome #5

1. Outcome Measures

Cost-effective solar power technology to heat and cool poultry houses will allow farmers to reduce their reliance on natural gas, oil, and purchased electricity, increasing the energy efficiency of poultry production.

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Increased number of farmers adopting new crop varieties and high value, niche market crops, (culinary herbs, spices and essential oils). Integrating innovations in cultural practices, biological and chemical pest management, harvesting equipment, and irrigation management into these systems, including feasibility studies of greenhouses to produce high value plants, such as those intended for pharmaceutical or nutriceutical uses.

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)
Minority producers seek guidance to increase marketing options for locally grown fresh fruits and vegetables, and increase the quantity of value added products.

What has been done
DSU Cooperative Extension worked in collaboration with partners to assist producer who are eager to increase their income by making value added products. Thus Producers benefits from a GAP/GHP best management classes conducted by University of Delaware. A value added workshop was planned and implemented in collaboration Delaware Center for enterprise development. Workshops were enhanced a bus tour, site visits, farm visits, group meetings and one on one mentoring. Participants and producer received information through newsletters, e-

mails and phone calls. A hands on approach was used to implement these workshops. The SERVSAFE program was conducted by Delaware Center for Enterprise Development.Finally, at all events participants, expand their knowledge on additional resources available through Delaware Department of Agriculture, USDA, and FDA. Thus they increase their knowledge on requirement for licenses, permits and other pre-requisites required to produce and sell value added products.

Results
A total of 40 participants mainly comprising of minority producers increase their knowledge and technical know-how to product value added products. Four producers are presently producing value added products such as specialty hot sauces and zucchini breads. Three of these farmers are minority producers. The produce is sold at farmers markets, at farm gate and retail establishments. The products are marketed locally and regionally in Philadelphia and New York City. Thus producers were able to increase the quantity of value added product to available markets.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management
903	Communication, Education, and Information Delivery

Outcome #7

1. Outcome Measures

Increase in the number of farmers and others (e.g., the "Green Industry" - greenhouses, nurseries, landscapers) implementing comprehensive nutrient management and conservation plans that are profitable and protective of ground and surface water quality, build soil quality, prevent soil erosion, and protect natural resource areas.

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)

Agriculture is one of the most important industries in Delaware, especially in Kent County. Growers, crop consultants, and agricultural industry folks all work together to produce a variety of crops including corn, soybeans, winter wheat, barley, fresh market and processing vegetables. This group represents the main clientele of the University of Delaware Agricultural Extension in Kent C

What has been done

In order to increase the knowledge of sound agriculture production practices, the Kent County Crop Master?s sessions were held in 2012. A total of four sessions were held in winter of 2012. The first session, 2012 Weed, Insect, and Disease Management Update, was held Wednesday, February 8, 2012 from 6pm-9pm. The session included a review of new and re-emerging crop pests (insects, diseases, weeds) in vegetable and grain crops. The second session, Maximizing Irrigated Corn Yields, was held on Wednesday, February 22, 2012 from 6pm-9pm. In this session, keys steps for producing a profitable, high yielding corn crop were presented. Relevant topics included corn growth, current herbicide programs, insect and disease management, irrigation, fertility, and agronomic practices to maximize yield. The third session, Get to Know your Soils, was held February 29 from 6pm-9pm. This session educated participants on the basics soil management for row crop production. Topics included an overview of Kent County soils, assessing soil properties, nutrient cycling, soil fertility, nutrient applications, improving vegetable soil health through the addition of organic matter, use of cover crops, and writing soil health plans. The last session, Tools for Irrigation Management, was held Tuesday, March 6, 2012 from 9am-11am. Around 25% of Delaware?s agriculture land is irrigated and the number of acres is rising. Topics include practices to determine soil moisture, timing of irrigation using soil moisture sensors, relationship of water use and crop growth stages, nutrient applications (fertigation), tracking irrigation events, and data from University of Delaware research projects. Overall, the session met the goal of increasing the knowledge level of clientele

Results

Evaluations were distributed to each participant at the end of each session. Participants answered by using a scale of 1 to 5 (1 meaning not at all and 5 meaning very much). Overall students ranked greater understanding of the subject matter at 4.22 out of 5, usefulness in farming operation at 4.26, and overall satisfaction at 4.38.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management
903	Communication, Education, and Information Delivery

Outcome #8

1. Outcome Measures

Increased use of soil management programs and best management practices for agricultural, natural, suburban/urban, and disturbed or contaminated settings that incorporate latest advances in research and greater adoption of watershed scale modeling to predict changes in the functions and environmental impacts of soils in mixed-used watersheds (agriculture, suburban, urban, forests) as land use changes from agricultural to suburban and urban uses.

Not Reporting on this Outcome Measure

Outcome #9

1. Outcome Measures

Improved economic competitiveness of Delaware agriculture relative to other regions in the U.S. and global competitors with an emphasis on greater adoption of new innovations in marketing and risk management for farmers who must increasingly compete globally.

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)
Farmwomen are often tasked with managing information systems used in critical decision making processes and risk management decisions in their operations

What has been done
Annie?s project is a national program designed to empower farmwomen to manage information systems used in critical decision making processes and to build local networks throughout the state. The target audience is farmwomen with a passion for business and involvement in the farm operation. Since 2008 Annie?s Project has expanded and reached 13 sites in Maryland and Delaware educating 357 farm women. Classes are structured in eight weekly sessions for three hours at a time (24 hours of class). University Educators and Specialists along with government organizations and private industry deliver timely risk management topics. To determine if the participants had actually followed through on their intentions, a follow-up survey is conducted 18

months after the class.

Results

Eighteen months was chosen as an appropriate time to survey the women because enough time would have elapsed to follow through with the skills and activities taught in the classes. Participants are invited via email, which included a web link for the survey. The surveys were anonymous and had a 48% average response rate. Participants were asked to complete ten questions regarding actions they have taken or implemented since they attended Annie?s Project. Both in the end-of-class and the follow-up evaluations, changing insurance policies and reviewing property titles and lease agreements are two actions that had the least intention to implement across all eight categories. However, one-half of the people who intended to change their insurance policy followed through on the action. For reasons unknown to the project investigators, there was low intent to review property titles and lease agreements and a very small percentage who actually did that. Class members leave the program with a high intent to write business and marketing plans, use computers, check credit reports, prepare financial statement, update estate plans, and positively increase community and family relations. Writing business and marketing plans was an action that participants wanted to do (96%) and 41% actually followed through. Checking credit reports, updating estate plans, and positively increasing family communications were the actions that the greatest majority of participants engaged in. Overall, the follow-up evaluations point to the fact that the program is successful in that women leave the program with the skills and knowledge to take action. A medium-term outcome of Annie?s project is to help ensure the economic viability of farming operations. Data obtained from the participants indicate that the program is successful in this regard. When asked if Annie?s Project has increased their profitability 47% responded that yes it has. A range of dollar increases were then available for selection. The average Annie's project participant since 2008 has increased farm profitability between $2,083.72 and $3,693.67 with the average participant increasing farm profitability by $3,027.78.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics
903	Communication, Education, and Information Delivery

Outcome #10

1. Outcome Measures

Increased interactions and long-range strategic planning efforts between research and extension staff and the diverse stakeholders (state and federal agencies, community groups, not-for-profit organizations, developers, farmers, etc.) involved in farmland preservation and land use conversion from agriculture to suburban and urban uses.

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)
Suburban and urban communities see a decreased connection with agricultural producers and fresh, local produce. There is increased demand for information on urban and backyard gardening as those individuals look for self sufficiency and an inexpensive means to produce fresh produce.

What has been done
The University of Delaware Cooperative Extension?s Lawn and Garden services include (ongoing) and on-site technical assistance to individuals and communities interested in growing fruits and vegetables, as well as soil testing and plant diagnostic services. We offer extensive educational programming with the help of our well-trained volunteer educators to include the Master Gardeners, Composters, and Food Educators. Programs include community presentations, home gardener and commercial grower workshops, and on-site and community demonstrations. Additionally, our demonstration and display gardens throughout the state have been designed to serve as an example of small-scale vegetable and fruit production (whether backyard, community, or small-scale commercial production) and to demonstrate good growing techniques. We have strengthened our programming and outreach efforts by working together with others, to include Nemours, the Food Bank of Delaware, the Delaware Department of Agriculture, and the Delaware Center for Horticulture.

Results
Just one way in which we?ve responded to this growing need for vegetable and fruit production information and education is by developing new workshops and demonstrations. In 2009 and 2010, the New Castle County Extension offered numerous Grow your own Food workshops and demonstrations, in varying formats, and locations, in our community. The Master Gardener Home Gardener Workshop Series featured the following topics: starting vegetables from seed, growing your own food, fruit production, composting, open houses and demonstrations in our teaching gardens, edible landscapes, and more. A Back to Basics workshop series was developed and offered to help people learn skills that they could use to save money, expand their resources, and live more simply; this series featured a basic vegetable gardening workshop alongside other topics such as organic production, small-scale growing techniques, and food preservation and preparation. Special events included a Day in the Garden event planned and offered by Master Gardener and Master Food Educators in the teaching and demonstration gardens to educate the community in vegetable gardening, and vegetable preparation. In 2009 and 2010 there were

more than 15 workshops that focused on the Grow your own Food theme, educating nearly 400 community members. This Grow your own Food theme continued into 2011 and 2012. Thus far, in 2011 and 2012, we have worked with and educated more than 500 community members. Additionally, in March 2012, a Community and School Garden Information Session was offered, in partnership with the Delaware Department of Agriculture, the Delaware Center for Horticulture, and Healthy Foods for Healthy Kids, for educators, community members, and gardeners starting or maintaining a community or school garden. This event attracted more than 50 participants from across the state. As a result of this session we continue to work closely with community and school gardens statewide, providing support and guidance as well as educational programming throughout the growing season. A similar community and school garden information session will be offered at the Sussex County Extension office this winter, 2013.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics
903	Communication, Education, and Information Delivery

Outcome #11

1. Outcome Measures

Disease Prevention and Control: basic and applied research on mechanisms of poultry disease will translate into useable tools and strategies for improved disease surveillance, diagnosis, prevention, and control in broiler chicken production. Knowledge will be extended to commercial poultry and allied industries.

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
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Avian disease outbreaks have the potential to collapse poultry industry markets around the world.

What has been done
The University of Delaware hosted its fourth annual Emergency Poultry Disease Response (EPDR) certificate program June 18-21. The workshop, which was held on the College of Agriculture and Natural Resources (CANR) campus, was aimed at teaching both local and international participants about preparedness planning, biosecurity and assessment, and rapid response techniques and technology with regard to avian disease outbreaks. Sponsored by the U.S. Department of Agriculture Avian Influenza Coordinated Agriculture Project 2, this year?s workshop included participants from all over the globe.

Results
Thirteen countries were represented, including Ghana, Saudi Arabia, Nigeria, Bolivia, Mexico and Japan. U.S. Sen. Chris Coons spoke at the opening of the event, talking about the importance of having strong measures in place to curb any avian disease outbreaks and praising UD for its role in helping educate local and international audiences on the topic.

4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes
307	Animal Management Systems
311	Animal Diseases
903	Communication, Education, and Information Delivery

Outcome #12

1. Outcome Measures

Animal Genomics: increased understanding of gene function and expression and targeting of candidate genes affecting economically important traits in broiler chicken growth and production, disease resistance and immunity. Improvements in classical poultry breeding programs by use of marker assisted selection (MAS) and technology transfer.

Not Reporting on this Outcome Measure

Outcome #13

1. Outcome Measures

Animal Nutrition: research will lead to improved understanding of nutritional requirements for poultry and ruminants and adoption of recommended dietary strategies by practicing nutritionists and producers. Specifically, results of poultry directed research aim to minimize nutrient contamination of the environment from manure. Results from ruminant based research will lead to improved management of forages to maximize nutritional value, safe use, and minimize spoilage during storage. Nutritional effects on dairy cattle health and immune function including factors impacting white blood cell gene expression will be studied. Research will also lead to improved understanding of the molecular and cellular mechanisms associated with bovine lameness and early detection of the disease

Not Reporting on this Outcome Measure

Outcome #14

1. Outcome Measures

Environmental Compatibility of Animal Agriculture: In addition to addressing nutrient related problems, research and extension programs will develop long-term strategies and management practices for other environmental issues related to animal agriculture such as the fate and transport of trace elements; concerns about air quality with ammonia, hydrogen sulfide, volatile organic compounds, and fine particulates originating from poultry houses; environmental and human health impacts of endocrine disruptors (estrogen, testosterone) found in manures; fate and transport of viruses and other pathogens during disease outbreaks and subsequent disposal of poultry mortality, and potential environmental and human health effects of antibiotics.

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
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
UD supports the Delaware Nutrient Management Law, aimed at educating the state?s diverse agriculture and horticulture producers on the importance of the relationship between nutrients and water quality issues.

What has been done
The Nutrient Management Program at the University of Delaware continues to offer Delaware Nutrient Management Certification Sessions to Delaware?s citizens who need to comply with the Delaware Nutrient Management Law.

Results
During this reporting period, 76 individuals became certified by the Nutrient Management Program. The Nutrient Management Program works with 2,411 individuals who are currently certified through the Nutrient Management Program. These individuals are required to attend

continuing education programs to maintain their certifications. During this reporting period, the University of Delaware approved 126 programs to offer Delaware Nutrient Management Continuing Education Credits. These programs were offered by public and private organizations, with 45 of the 126 programs offered by the University of Delaware. The University of Delaware Programs offered 98 continuing education credits with a total attendance of 1,796. The other 83 programs, presented by public and private organizations, offered 199.25 credits to 933 attendees. The continuing education programs offered by organizations outside the University of Delaware can be valued at $51.27 per participant for a total of value of $47,834.91 based on the value of $21.36 per volunteer hour. These figures only account for the period of time for instruction and they do not take into account the amount of time that is spent on preparing materials for the program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
205	Plant Management Systems
305	Animal Physiological Processes
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics
903	Communication, Education, and Information Delivery

Outcome #15

1. Outcome Measures

Plant Biology and Crop Production: basic research will lead to improved understanding of plant molecular biology and allow genetic manipulation of physiological processes important to increasing crop yields and quality and crop resistance to biotic and abiotic stresses. Applied research and extension programs on cultural practices, crop varieties, fertilizer and manure use, precision agriculture, and integrated pest management will increase crop yields, minimize costs, and protect environmental quality. Extension programs will guide management practices for horticultural plants for the "Green Industry" and for homeowners, important because of the rapid conversion of farmland to urban and suburban uses.

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
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In the Mid-Atlantic Region (DE, MD, VA, WV and NJ), there are currently 300 plus certified crop advisers who require continuing education.

What has been done
To address the continuing education needs our clientele as a whole, a collaborative group including the Universities of Delaware, Maryland , West Virginia, and Virginia Tech; NRCS in Maryland and Delaware; and the Mid-Atlantic CCA Board established our Mid-Atlantic Crop Management School in 1995. This school provides a diversity of educational programs in a 2 ½ day format with a variety a breakout sessions. Five concurrent sessions are offered addressing nutrient management, crop management, integrated pest management, soil and water management, and an alternative track on horticulture that offers a variety of credit categories (NM, CM, SWM, PM, and PD professional development). Emphasis is placed on new and advanced information with group discussion and interaction encouraged. In general, there are approximately 50 speakers and 230 + participants. School participants include agronomists, crop consultants, extension educators, farmers and farm managers, agribusiness, soil conservationists, and state department of agriculture personnel. Each year from ninety seven to one hundred percent of the school participants indicate that the school will allow them to provide better crop management information to their clientele.

Results
Crop school participants indicated that the economic value of the school to their clientele is $26 per acre. Crop school participants consult on approximately 570,000 acres in the Mid-Atlantic region. Overall economic impact of the school for the Mid-Atlantic Region is estimated to be $14,500,000.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management
903	Communication, Education, and Information Delivery

Outcome #16

1. Outcome Measures

New Markets: advances in plant molecular biology and genomics will provide new markets for farmers and commercial-scale horticulture, such as plants for bioenergy, pharmaceutical and nutriceutical uses. New and creative marketing programs will stimulate diversification and growth in the production of value-added and niche market crops, such as culinary herbs, spices, essential oil plants, and specialty vegetables for urban and suburban markets.

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
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Most farmers do not have any experience growing in them. For high tunnels to truly be successful farmers need somewhere to turn to so they can get started actually growing in them. High Tunnels are an excellent way to add value to a growing operation. These high tunnels can keep small farmers in business if they can use them.

What has been done
The DSU high tunnel project actually started at a Profiting from A Few Acres Conference in 2011. At that Conference DSU specialists talked with several growers who had had received funding for high tunnels and others who had applied for one. Some of the questions where what to plant, when to plant and many others. It was apparent that there was a need for a program on using a high tunnel. Three orkshops were planned and implemented involing high tunnels. The first one was held at Dennis Edwards farm up at Summit Bridge. That was aimed at preparing the tunnel and some of the crops you can grow in them. There were over twenty farmers attending this workshop. In April the High Tunnel speciallist, Dr. Wm LaMont from Penn State University came to talk about growing in High Tunnels. About twenty growers attend this as well. The most successful workshop of the year was held in Georgetown at the farm of Ed Zitvogl. This was in May and there were over sixty-five participants. Participants were shown some specific crop examples. Ed had tomatoes almost ready to pick. There was also a Van tour that stopped at Ed's farm.

Results

The workshops offered have reached 250 people in total with 52 total on-farm visits. In 2010 DSU worked with two farmers with high tunnels. In 2011 it was three, and in 2012 that number had grown to ten. In 2011 Ed made $0.00 from his tunnel. In 2012 he grossed $15,000.00, Dennis made $0.00 in 2011 from his tunnel. He grossed a little over $4,000.00 in 2012.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics

Outcome #17

1. Outcome Measures

Land Use Change: research will identify strategies needed to manage land use change in a state where preserving farmland is a major goal, but economic and social forces are resulting in steady conversion of agricultural lands to suburban and urban uses. The economic, social, and cultural impacts of land fragmentation, suburban sprawl, and the "critical mass" of land and businesses needed to sustain agriculture in the long-term will be determined. Research knowledge and extension programs will guide long-term land use planning in cooperation with state and local agencies and governments, community groups, and other stakeholders

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
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Cape Henlopen Region is considered a special place. It is valued by its citizenry for its intimate coastal towns, its unique cultures, its accessibility from several large mid-Atlantic seaboard cities and ports that drive its seasonal tourism industry, its natural beauty preserved in the coastal State Parks and Prime Hook National Wildlife Refuge, and its local heritage emanating from colonial days. While many local area growth studies have been performed the Cape Region remains subject to 1) local zoning regulations that encourage fragmented development and 2) jurisdiction-specific Comprehensive Plans that inadequately define future growth areas. None of these studies has been implemented, nor have any action plans been developed based on those studies. Decisions on land use remain isolated to the jurisdiction and often cause community concern regarding the lack of cross-jurisdictional values taken into consideration in land use decisions. The question then becomes: How do we collaborate regionally to preserve the character of our valued towns and the attractiveness of our coastal area to tourism, while growing residentially and economically for future generations?

What has been done

Cooperative Extension (CE) in partnership with Sea-grant Marine Advisory Service (MAS) and Institute for Public Administration (IPA) through the Sustainable Coastal Community Initiative (SCCI) developed and implemented a multi-faceted approach for regional planning. The core strategy is to engage the community in a meaningful way at the beginning of the planning process. SCCI does this through sophisticated land use modeling using Community-Viz©, developing future scenarios or stories to help the community visualize their own scenario. This methodology is particularly useful in a multi-jurisdictional process where participants may feel uncomfortable planning outside their official bounds. Supporters of regional planning understand: Growth issues move across landscapes and political boundaries- they are common to all; Conflicting uses occur between jurisdictions regarding economic, social and environmental use of the land and need resolution before growing and; Provides for cross-jurisdictional plans including predictability for development and readiness for emergency services. The process includes community members, developers, non-government and business stakeholders and requires cooperation, tradeoffs and consensus building.

Results

The SCCI process has resulted in regional plans in two jurisdictions as of 2012. The current project, the Cape Henlopen Region is the largest and most ambitious project to date covering over 40,000 acres, four towns, county and state government. The project is the summary project of over 10 years of planning in the region. A website http://www.capehenlopenregionalplan.org/ fully explains the project and encourages public participation in community meetings or via the website. To date the project has resulted in several public meetings and media response, comments to the website indicating website use and further development of the community engagement process using Wii Table technology. The project will be completed in 2013.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
605	Natural Resource and Environmental Economics
903	Communication, Education, and Information Delivery

Outcome #18

1. Outcome Measures

International Economics and Trade: research will provide strategies to foster international trade and economic growth in developed and developing countries, with an emphasis on policy issues related to agricultural and energy markets and climate change, particularly those related to poultry production and bioenergy crops. Extension programs will educate agricultural producers on international marketing strategies for traditional agricultural products (e.g., poultry, grain crops) as well as new cropping systems, such as organic agriculture and genetically modified crops.

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
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
UD seeks to build international partnerships to support agricultural trade and exchange of information.

What has been done
Three professors?Greg Shriver, Nicole Donofrio and Tom Powers--and two graduate students from the University of Delaware spent spring break in Brazil, visiting the University Federal de Lavras (UFLA) campus, strengthening the academic and cultural bonds between the two universities and taking in the sites and sounds of the South American nation. In addition, four UD College of Agriculture and Natural Resources (CANR) undergraduate students have been selected for an opportunity to develop international teaching modules in conjunction with professors and students at UFLA and UD, and to visit this University in 2013.

Results
The project is led by a faculty team from CANR and the College of Arts and Sciences (CAS) and is intended to help build longstanding academic programs and research partnerships with UFLA that will enhance the international nature of curricula in areas of common interest, such as food

security, bioenergy animal agriculture and biodiversity. The project will also aim to stimulate creative thinking in the students who participate about how to develop innovative solutions to complex global agricultural and environmental problems.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics
903	Communication, Education, and Information Delivery

Outcome #19

1. Outcome Measures

Educational programs for K-12 teachers and youth on: (i) advances in animal and plant molecular biology and applications of the basic animal and plant sciences to the production of animals and of plants used for food, fiber, landscaping, timber, bioenergy, and pharmaceutical and nutriceutical purposes; (ii) value of soils as a critical natural resource vital to civilization, including the many functions of soils in agricultural and natural ecosystems, the importance of soil management to environmental quality, and the role of soils in sustaining aesthetically pleasing managed landscapes in suburban and urban settings; and (iii) the relationship between land use and major societal issues, such as economic development, community and family adaptation to changing social and political conditions, and the value of sustaining ecosystems and protecting environmental quality.

Not Reporting on this Outcome Measure

Outcome #20

1. Outcome Measures

Soils and Environment: basic research will increase understanding of physical, chemical, and biological factors influencing the fate and transport of nutrients, metals, organics, and pathogens in soils. Applied research will lead to development of nutrient management strategies and recommendations that minimize nonpoint nutrient pollution from all land uses. Remediation practices for soils contaminated by metals, organics, and nutrients will use innovative, research-based measures to prioritize risk to the environment and human health based on the speciation, mobility, and bioavailability of contaminants in soils. Mitigation approaches for polluted soils will combine soil chemistry, physics, and soil/plant molecular biology to enhance removal or in-situ degradation or stabilization of pollutants in soils.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- 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

Evaluation of the Global Food Security and Hunger planned program for FY 12 (70 research FTEs, 24 Extension FTEs) indicates continued strong efforts in basic and applied research and extension activity. Food security and agricultural productivity has long been a primary area of emphasis in the state. Delaware's agricultural systems, particularly poultry, grain, and vegetable crop production, are linked closely with exports to other countries and serve as models for the application of new knowledge, derived from basic research, to challenges in emerging and developed countries worldwide. Research grants (35 awarded) supported the efforts of 147 graduate students, post-docs, and undergraduate researchers who published 56 refereed journal articles and book chapters, made 339 invited and volunteered presentations, and conducted 216 workshops on improved efforts to contribute to the global need for a safe and secure food supply, increase agricultural profitability, become more competitive in global markets, and ensure the environmental compatibility of all forms of agriculture. Our evaluations have included annual internal administrative reviews, periodic University level Academic Program Reviews, and - for extension - surveys and other evaluations conducted with stakeholders participating in workshops and other extension programs. In general, we have received very positive feedback from the agricultural and natural resource communities about the programs we conduct related to Global Food Security and Hunger.

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 that seek to further expand our efforts to address the global challenges related to producing a safe and secure food supply.