

2011 Pennsylvania State University Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

Penn State's Agricultural Experiment Station and Cooperative Extension Service operate in concert within the College of Agricultural Sciences to address present and future needs in agriculture at local, national, and international scales. The College operates on the basis of shared decision-making regarding investment of AES and CES resources. During 2011, the College continued the implementation of our current strategic plan to move forward an agenda around our five strategic initiatives: energy, entrepreneurship, water quality and quantity, pest prediction and response, and food, diet, and health. We have just completed an assessment of progress and have refined our strategic initiatives and action items accordingly.

Research and extension are integrated largely through joint appointments in the College of Agricultural Sciences. Of 618 administrators, faculty and staff at University Park, 228 have a combination of research and extension funds supporting their positions. Extension programs have been delivered by 19 work groups that focus on key issues identified as priorities for the college. The work groups serve to unite faculty and county-based educators in a common goal of generating new knowledge, offering high quality, focused extension education programs on stakeholder-identified subjects, and identifying and addressing science gaps on the basis of feedback from these educational programs. We connect in research with resources across campus through the Penn State Institute system (Life Sciences, Materials, Social Science, Environment and Energy), and the CES work groups provide a mechanism to connect with and leverage research expertise outside the AES purview from across campus.

Our programs continue to focus on high profile problems that, in addition to their impact in Pennsylvania, frequently also represent regional and national priorities. Information in this report on our work in the Chesapeake Bay and nutrient management is a regional issue of great interest to the US government, and this work is quite possibly setting benchmarks by which other US watersheds will be approached. Our continued efforts in Marcellus Shale natural gas, now much more focused on extraction and related environmental and community problems, also demonstrates how we are addressing issues in energy and the environment. We have built and are using predictive models that allow more targeted pest management through our extension programs, examining how best to preserve pollinators in support of the food supply, and studying the impact of invasive species on Pennsylvania and US agriculture. PA AES and CES must be responsive to new societal needs, investing our federal funds in a manner that furthers national agricultural goals but also addressing the local implications of those national priorities.

A few explanatory notes are necessary regarding the report that follows:

First, PA CES captures data on contacts (direct and indirect) and participants. We consider participants to be the number of individuals who attend our educational programs. Our contact numbers are derived from the number of people each of our extension educators and/or faculty have contacted. Direct contact numbers are only those from face-to-face meetings, office visits, workshops, etc; indirect contacts are through email, telephone conversations, and Adobe Connect sessions, etc.

In addition, this annual report includes a significant increase in the amount of professional research time reported. Based on guidance in the AREERA States Plan of Work Newsletter (Volume 7, No. 2) we are reporting both Scientist Years (SYs) and Professional Years (PYs). In the past, we have only reported

the SYs.

Over the past year, the College of Agricultural Sciences has been reorganizing from 12 to 9 academic departments and developing a new extension structure composed of program teams that align with our new academic departments. We are implementing a new system to measure impacts that can be used for federal reporting as well as our own college-wide planning, assessment, improvement, and strategic communication. We are currently planning and creating the mechanism and tools to gather data that will allow us to include Change in Condition outcomes in future year's reports.

Lastly, we are discontinuing our state defined outcome on volunteers and will reporting the appropriate numbers in the input section of each planned program. We appreciate this field being added to the reporting software.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	274.6	0.0	298.5	0.0
Actual	418.8	0.0	623.2	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

- Internal University Panel
- Combined External and Internal University Panel
- Expert Peer Review

2. Brief Explanation

Both cooperative extension and agricultural experiment station programs undergo thorough and comprehensive review processes.

Pennsylvania Agricultural Experiment Station projects, which partially comprise our planned programs, are reviewed by qualified and knowledgeable scientists. Non multistate projects are reviewed internally, while multistate projects are reviewed by external reviewers.

As new Penn State extension programmatic issues or agricultural experiment station projects are implemented, stakeholder groups and/or program advisory groups provide ongoing review of the educational and research programs to ensure that programs are focusing on priority needs as identified by key advisory groups in the college. All reviewers' critiques and comments provide us with mechanisms for enriching and improving our educational and research programs.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals

Brief explanation.

Stakeholder input is actively sought to help set the course for CES and AES programs. Our Penn State Ag Council (<http://agcouncil.cas.psu.edu>) recently recommended a new advisory structure for our extension programs. Delegates will be providing formal input into extension program area learning goals and will prioritize existing programming. As this is implemented, we will schedule advisory reviews twice a year to evaluate progress and identify changing needs. Extension teams are being charged with consolidating and standardizing their educational offerings, and they are doing this with the involvement of their stakeholder advisory groups.

During the past year we started the implementation of recommendations from the Penn State University Core Council as well as our college AG Futures process. Review data were obtained via a comprehensive stakeholder survey. These data assisted us in our reorganization from 12 to 9 academic departments and a reformulation of our extension program teams to align them with our new academic departments and in turn enable greater integration of our research and extension functions. Each of our academic departments will engage with a stakeholder advisory group, as will our extension teams. Members will be drawn from traditional stakeholder groups, including Ag Council and Penn State Cooperative Extension Council, and non-traditional stakeholder groups.

College administration and faculty advisory groups confer regularly with key stakeholder groups. The Penn State Agricultural Council provides us with direct contact to nearly 100 member organizations and groups representing the agricultural industry across Pennsylvania. Also part of the Ag Council membership is such organizations as the Chesapeake Bay Foundation and the County Commissioners Association of Pennsylvania--we seek input for all sectors representing the interest of Pennsylvania citizens. In addition, we meet multiple times per year with stakeholder groups including, but not limited to, the Pennsylvania Farm Bureau, PennAg Industries, State Horticultural Association of Pennsylvania, Pennsylvania Agronomic Education Society, Pennsylvania Association for Sustainable Agriculture, Penn State Cooperative Extension Council, the Pennsylvania Christmas Tree Growers Association, and the Pennsylvania Floral Industry Association. These meetings provide us with direct access to key stakeholders for regular listening sessions.

Penn State has a well-developed organizational structure for interacting with industry; our Industrial Research Office serves as a liaison to specific industrial partners. Also in our stakeholder base are state and federal partners; we have regularly scheduled meetings with agencies such as the Pennsylvania Department of Agriculture, Pennsylvania Department of Environmental Protection,

Pennsylvania Department of Health, and U.S. Department of Agriculture's Agricultural Research Service and Animal and Plant Health Inspection Service. These stakeholder meetings provide feedback on programming for Hatch, McIntire-Stennis, Smith-Lever, and Animal Health funds.

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

Extension teams are being charged with consolidating and standardizing their educational offerings, and they are doing this with the involvement of their stakeholder advisory groups. Our Penn State Ag Council (<http://agcouncil.cas.psu.edu>) recently recommended a new advisory structure for our extension programs. Delegates will be providing formal input into extension program area learning goals and will assist in the prioritization of existing programming. Program advisory committee members are selected to represent program areas, emerging issues, geographic areas, and population diversity. As the new advisory structure is implemented, we will schedule advisory reviews twice a year to evaluate progress and identify changing needs. These groups help extension educators with program design and implementation, which may include identifying resources to support the programs, tailoring the content to specific audience needs, and marketing the programs to targeted audiences and communities.

In the establishment of program advisory committees, our policy is that these committees need to represent the demographics of the commodity, community, and workforce. Committees are representative of demographics of the county and where appropriate Hispanics, African American, Asian, or other minorities serve on these groups and provide input to extension programs. Penn State Agricultural Council meetings are publicly announced and our broad representation is constantly reassessed to ensure that new and traditionally underserved audiences are included.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Survey of traditional Stakeholder individuals
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups

Brief explanation.

To collect stakeholder input, educators or faculty met with program advisory committees or individuals or solicited input at educational meetings. During and after extension educational programs, program participants request additional programs, updates, or make suggestions on new

topics where an educational program would be helpful to them.

To collect more detailed information from traditional and non-traditional stakeholders, the college conducted a comprehensive stakeholder survey. These data assisted us in our reorganization from 12 to 9 academic departments and a reformulation of our extension program teams to align them with our new academic departments and in turn enable greater integration of our research and extension functions. Survey data were used to determine the college's emerging strategic initiatives and will be used to structure the impact measures we will start using in the upcoming year.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

Brief explanation.

Information collected from stakeholders was used to adjust issue areas that determined Cooperative Extension programming. These stakeholder priorities also directly influenced applied research activity through local decisions about research priorities, availability of funding from certain extramural funding sources including stakeholder groups such as industry associations, and hiring decisions for faculty and extension educators. Stakeholder input not only informs planning, but also influences resource allocations. Stakeholder feedback also indicates where volunteers and donors would be interested in assisting with the program.

As part of the implementation plan for our current strategic plan, we have engaged representatives of the Penn State Agricultural Council as key team members on our internal implementation teams. This serves to inform our programs on the real-world demands for new information and programs.

Brief Explanation of what you learned from your Stakeholders

Stakeholders provide grassroots view of what is important. Marcellus Shale public meetings continue to have high attendance; many meetings extended to other issues related to this emerging issue such as water resources and forest management. Stakeholders statewide are concerned about water quality and quantity and the long range effect the natural gas drilling will have on PA natural resources. Extension aided many county governments to form County Marcellus Task Forces; these efforts were through extension work at the state organization of County Commissioner's Association of Pennsylvania (CCAP).

Most popular programs continue to be in 4-H youth development and horticulture and green industry; both programs engage volunteers in their delivery, therefore larger participant numbers. Other programs with high participation are agronomic production, agricultural profitability, animal production, strengthen and supporting families, and diet nutrition and health. Programs that are growing are related to renewable resources, agricultural profitability, and diet, nutrition, and health. Stakeholders in agricultural programs continue to be focused on the safe production of food and profitability of such enterprises; new Good Agricultural Practices (GAP) regulations in edible

horticulture production is key for producers' profitability; diet, nutrition and health programs are focused on childhood obesity, diabetes and older women's health, all key public health issues. Extension continues to strategically work with diverse audiences in many programs. Minorities serve on extension boards and advisory committees and are key to helping market extension programs in their communities.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
10145564	0	7517659	0

2. Totaled Actual dollars from Planned Programs Inputs				
Extension			Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	9397906	0	7133624	0
Actual Matching	24393325	0	28332944	0
Actual All Other	18461205	0	30428670	0
Total Actual Expended	52252436	0	65895238	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	1499990	0	3265986	0

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Agricultural Systems
2	Families, Youth, and Communities
3	Natural Resources and Environment
4	Pest Management
5	Global Food Security and Hunger
6	Climate Change
7	Sustainable Energy
8	Childhood Obesity
9	Food Safety

V(A). Planned Program (Summary)**Program # 1****1. Name of the Planned Program**

Agricultural Systems

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	9%		11%	
204	Plant Product Quality and Utility (Preharvest)	5%		4%	
205	Plant Management Systems	9%		11%	
206	Basic Plant Biology	3%		8%	
301	Reproductive Performance of Animals	9%		6%	
302	Nutrient Utilization in Animals	7%		6%	
303	Genetic Improvement of Animals	5%		3%	
304	Animal Genome	4%		5%	
305	Animal Physiological Processes	3%		8%	
307	Animal Management Systems	9%		2%	
308	Improved Animal Products (Before Harvest)	3%		3%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	6%		3%	
402	Engineering Systems and Equipment	3%		8%	
501	New and Improved Food Processing Technologies	6%		6%	
502	New and Improved Food Products	3%		4%	
601	Economics of Agricultural Production and Farm Management	3%		2%	
602	Business Management, Finance, and Taxation	6%		2%	
603	Market Economics	3%		2%	
604	Marketing and Distribution Practices	2%		4%	
610	Domestic Policy Analysis	2%		2%	
	Total	100%		100%	

V(C). Planned Program (Inputs)**1. Actual amount of FTE/SYs expended this Program**

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	70.0	0.0	75.0	0.0
Actual Paid Professional	117.5	0.0	217.2	0.0
Actual Volunteer	3.2	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
3308191	0	3039543	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
8334974	0	11162614	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
4054987	0	9742824	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Developing and delivering the latest science is important to sustain and grow the production and economic efficiency of plant and animal agriculture in the Commonwealth. Research to improve the reproductive biology of animals is highly relevant to two key Pennsylvania agricultural industries, dairy and poultry. Insights into ovarian function as predictors of fertility are providing new methods to enhance reproduction in cattle. While enhancing fertility is one element of the overall production equation, research into balanced breeding programs that consider all aspects of dairy cattle production are determining the optimal relationship between cow fertility and milk production efficiency. Management systems that stress optimal nutrient composition of diets for heifers and lactating cows are further contributing to the sustainability, both economic and environmental, of dairy operations. Animal science extension programs delivered numerous programs to the dairy, livestock, poultry, and equine industries. Regionally and nationally visible dairy extension programs focused on dairy herd management areas such as risk management, best milking practices, facility and employee management, nutrient management, health, and reproduction nutrition. The livestock extension team delivered a variety of programs including farm management, animal welfare, health, and quality assurance. Adult equine programs focused on environmental stewardship through workshops and farm demonstrations. The PA Egg Quality Assurance Program coordinated certificate training programs and presented programs to the poultry industry about effective IMP programs for fly control. Animal and plant agriculture in Pennsylvania are often integrated farming systems. Dairy producers directly benefited from corn silage variety testing and the development of improved forage management systems for alfalfa and forage grasses. Small grain variety tests conducted for winter wheat and winter barley provided performance information to producers and led to commercialization of several barley lines. Field trials also demonstrated that winter canola can be economically competitive with other crops in the region. Agronomic crop experts provided training on topics such as no-till systems, protecting water quality, and Integrated Pest Management. Production system economic analyses continued to assist producers in making critical risk management decisions in a wide variety of agronomic and horticultural crops. These programs help farmers to be more profitable while

protecting natural resources, including the Chesapeake Bay. Extension programs for horticultural crop producers have focused on providing research-based solutions to maintaining and increasing profitability. Good agricultural practices to increase food safety are becoming a market requirement for some outlets. Our programs also served the green industry as well as all fruit and vegetable producers. Finally, the Agricultural Entrepreneurship team directly impacted farmers, food manufacturers, and pre-venture business owners through programs on business planning, marketing, financial management, farm record keeping, and other management topics.

2. Brief description of the target audience

Target audiences include agricultural producers, commodity groups, consultants, farm owners, farm managers, farm workers, farm consultants, agribusiness, agricultural professionals, state and federal agencies, and decision and policy makers.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	558284	23808578	4089	4035

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

Patent Applications Submitted

Year: 2011

Actual: 6

Patents listed

Serial No: 61/474,501; Filed: 4/12/2011; Title: Apparatus and Method for No-till Inter-row Simultaneous Application of Herbicide and Fertilizer, Soil Preparation, and Seeding of a Cover Crop in a Standing Crop

Serial No: PCT/US2011/0388; Filed: 6/2/2011; Title: Plant-derived Feed Supplement for Reducing Methane Production from Ruminant Species

Serial No: PCT/US2011/0225; Filed: 1/26/2011; Title: Method of Increasing Soil Resource Capture in a Plant

Serial No: PCT/US2011/032087; Filed: 4/12/2011; Title: Strategies for the Transgenic Manipulation of Filamentous Fungi

Serial No: 100112892; Filed: 4/14/2011; Title: Strategies for the Transgenic Manipulation of Filamentous Fungi

Serial No: 12/910,098; Filed: 10/22/2010; Title: Reversible Inhibition of Sperm Receptor Synthesis for Contraception

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	0	422

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of invention disclosures submitted.

Year	Actual
2011	5

Output #2

Output Measure

- Number of people enrolled and/or registered in programs.

Year	Actual
2011	168117

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants who were evaluated and demonstrated increased knowledge and skills.
2	Number of participants who were evaluated in a follow-up and who implemented/adopted practices.
3	Number of volunteers that helped with program leadership or delivery.

Outcome #1

1. Outcome Measures

Number of participants who were evaluated and demonstrated increased knowledge and skills.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	13122

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Agriculture is the largest industry in the Commonwealth. The Food System (the production and flow of food from farm to fork) is integral for the well-being of all citizens. In addition, a robust state and national Food System is integral for national security reasons. The equine industry in PA is a large economic sector that relies on science-based information from extension, in a variety of areas, to sustain and grow this industry. It is imperative that extension successfully develop and deliver a multitude of educational programs that are a benefit to clientele to help sustain and grow production agriculture and agribusiness in Pennsylvania.

What has been done

An impressive number of educational programs including conferences, seminars, educational tours, field days, workshops (live and via webinars, Twitter, Facebook), train-the-trainer programs, and individual consultations (via email, one-on-one meetings, telephone calls) have been used to deliver best practices for sustaining and growing the Ag System in Pennsylvania.

Results

An impressive number of educational programs including conferences, seminars, educational tours, field days, workshops (live and via webinars, Twitter, Facebook), train-the-trainer programs, and individual consultations (via email, one-on-one meetings, telephone calls) have been used to deliver best practices for sustaining and growing the Ag System in Pennsylvania.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms

204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
304	Animal Genome
305	Animal Physiological Processes
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
402	Engineering Systems and Equipment
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
610	Domestic Policy Analysis

Outcome #2

1. Outcome Measures

Number of participants who were evaluated in a follow-up and who implemented/adopted practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	7599

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Agriculture is the largest industry in the Commonwealth. The Food System (the production and flow of food from farm to fork) is integral for the well-being of all citizens. In addition, a robust state and national Food System is integral for national security reasons. The equine industry in PA is a large economic sector that relies on science-based information from extension, in a variety of areas, to sustain and grow this industry. It is imperative that extension successfully develop and deliver a multitude of educational programs that are a benefit to clientele to help sustain and grow production agriculture and agribusiness in Pennsylvania.

What has been done

An impressive number of educational programs including conferences, seminars, educational tours, field days, workshops (live and via webinars, Twitter, Facebook), train-the-trainer programs, and individual consultations (via email, one-on-one meetings, telephone calls) have been used to deliver best practices for sustaining and growing the Ag System in Pennsylvania.

Results

Best management practices related to agricultural production and profitability have been adopted. These include nutrient management plans, Integrated Pest Management practices, farm record keeping systems, fecal egg count monitoring in equine, food safety plans, and other important managerial practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
304	Animal Genome
305	Animal Physiological Processes
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
402	Engineering Systems and Equipment
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
610	Domestic Policy Analysis

Outcome #3

1. Outcome Measures

Number of volunteers that helped with program leadership or delivery.

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
- Other (Extramural Funding)

Brief Explanation

A significant reduction (19%) in State funding impacted both the research and extension functions of the College of Agricultural Sciences. The reduction in State appropriated funds resulted in retirements and layoffs of key faculty and staff, impacting all areas of the College. This has resulted in a decrease in the number of county-based educators available to develop and deliver programs in production agriculture (including the equine industry). This has had consequent impact on the infrastructure that is needed to meet the needs of agriculture in Pennsylvania. The increase in regulatory policies in food safety, nutrient management, and water quality has added to the challenge of meeting the needs of extension clientele in the Commonwealth. Weather has a huge impact on crop and animal production, as well.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of evaluation tools were employed to provide input about the effectiveness and impact of extension programs that were delivered. A sampling of the results is presented herein. A composite of survey results of attendees at Penn State Extension Dairy Team programs conveyed that programs were excellent/good. For example, 97% responded excellent/good in providing unbiased information (N = 358); 96% responded similarly relative to quality of program materials (N = 357); 96% responded excellent in providing information that met their needs (N = 360). For the Livestock Extension Team, 94% of respondents (699 participants) indicated an increase in knowledge by attending the programs and 81% (21/39) achieved certification in the Transport Quality Assurance program. The equine extension team procured a large grant (\$340,000) from the

Chesapeake Bay Foundation to develop and deliver pasture and nutrient management programs to equine operations. In 2011, 69 educational workshops and field days were offered; 6,675 farm managers and agency and industry representatives attended. Selected survey results indicate that 90% of attendees demonstrated increased knowledge and skills (N= 2000). One key indicator of success has been that everyone who has gone through training to be a certified nutrient management planner has passed the exam. This has led to over 2,000 plans being written in PA. All respondents (N=176) indicated that training on good agricultural practices increased their knowledge and skills. In programs for the Green Industry, 65% of respondents (N=784) indicated that the training would improve profitability. Ninety percent of respondents (N=159) of the Mid-Atlantic Fruit and Vegetable Conference indicated that the conference improves their profitability.

Key Items of Evaluation

The University offers a broad array of extension programs to a large clientele cohort. To collect the information for program evaluation takes considerable time. Based on the survey data, Ag Systems Extension programs are having a very positive impact on extension clientele. This is important, and noteworthy, given the scale and scope of agriculture in Pennsylvania.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Families, Youth, and Communities

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
134	Outdoor Recreation	1%		0%	
503	Quality Maintenance in Storing and Marketing Food Products	1%		0%	
504	Home and Commercial Food Service	5%		0%	
512	Quality Maintenance in Storing and Marketing Non-Food Products	1%		2%	
607	Consumer Economics	3%		5%	
608	Community Resource Planning and Development	10%		6%	
701	Nutrient Composition of Food	2%		1%	
702	Requirements and Function of Nutrients and Other Food Components	4%		7%	
704	Nutrition and Hunger in the Population	10%		0%	
721	Insects and Other Pests Affecting Humans	6%		2%	
723	Hazards to Human Health and Safety	5%		33%	
801	Individual and Family Resource Management	3%		4%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	1%		12%	
805	Community Institutions, Health, and Social Services	0%		5%	
806	Youth Development	47%		5%	
903	Communication, Education, and Information Delivery	1%		18%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	185.0	0.0	28.0	0.0

Actual Paid Professional	181.4	0.0	76.7	0.0
Actual Volunteer	322.0	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
3190143	0	607779	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
8717511	0	2848425	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
9978763	0	3997119	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Food, nutrition, and health are key components of the research and outreach programs conducted at Penn State in the area of Families, Youth, and Communities. Research on functional foods and food ingredients or nutritional supplements reinforces the linkages between food and health. For example, vitamin D was shown to be critical for the maintenance of a healthy gastrointestinal track and positive effects of vitamin D on immune function are the result of changes in the gastrointestinal microbiome. Other dietary changes such as the inclusion of edible mushrooms or dietary lactose also affect the health of the gut through changes in the bacterial microflora. Inflammation is one of the major underlying factors in many diseases, such as arthritis, cancer, HIV, and cardiovascular diseases. Bioactive polyphenols in cocoa have anti-inflammatory effects and selenium, an essential micronutrient for humans and animals, has anti-inflammatory activity in immune cells and reduces cancer stem cell pools and transcription of HIV-1. Bioactive polyphenols such as those found in green tea interfere with dietary fat absorption and improves fatty acid oxidation in skeletal muscle that can be enhanced by exercise. While research is contributing to our fundamental understanding of food and health, outreach activities through Penn State Extension nutritional programs continued to impact the health of Pennsylvania citizens. The evidence-based program StrongWomen/Growing Stronger was delivered as a series of 24 physical activity and nutrition classes, meeting twice weekly for 12 weeks. The program addressed nutrition to reduce risk to chronic disease and included discussion on fruits and vegetables, whole grains and fiber, and consuming more calcium and vitamin D, as well as, the importance of physical activity to strengthen bone density, and improve balance and flexibility. The Dining with Diabetes program was offered in four weekly sessions followed by a three month follow-up class that addressed bio-markers, nutrition, physical activity, food demonstrations, and evaluation. 4-H programs concentrated on three primary mission mandate areas (STEM education, citizenship, and healthy living). The 4-H curriculum of science-based learning experiences employed standard modules focused on building the science of inquiry into 4-H curricula statewide to train professional staff, volunteers, and 4-H members. Science offerings were expanded to include robotics, wind energy, water, and other energy curricula. Youth shared their knowledge with the public while attending Farm Show and Ag Progress Days and demonstrated their knowledge at 4-H State Achievement Days. Pennsylvania 4-H was invited to host the Northeast Regional Science Academy. The Pennsylvania Municipal Planning Education Institute (PMPEI) provided ten hours of interactive educational programming for municipal citizen planners, zoning officials, and elected officials on land use planning issues. These programs consist of four courses on planning, subdivision and land development, and zoning presented by two certified instructors.

2. Brief description of the target audience

Target audiences include general public, health care professionals, dieticians, diabetics, at-risk individuals, youth, military families, county and municipal planning commissioners, zoning officials, elected officials, policy makers, engineers, attorneys, child care providers, parents, non-profit organizations, business owners, residents, and real estate professionals.

3. How was eXtension used?

The 4-H program refers clientele to eXtension's Ask the Expert site for specific questions particularly on livestock and horses. Several 4-H Extension Educators are participating in Communities of Practice including HorseQuest and the 4-H Science Learning Circle under Evaluation.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	251559	1714315	1736716	139331

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

Patent Applications Submitted

Year: 2011

Actual: 2

Patents listed

Serial No: 61/502,677; Filed: 6/29/2011; Title: Anti-leukemic Property of Cyclopentenone Prostaglandin Metabolite of Omega-3 Fatty Acid

Serial No: 61/535,149; Filed: 9/15/2011; Title: Compositions, Methods and Kits for Treating Leukemia

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	0	176

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of invention disclosures submitted.

Year	Actual
2011	1

Output #2

Output Measure

- Number of people enrolled and/or registered in programs.

Year	Actual
2011	351330

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants who were evaluated and demonstrated increased knowledge and skills.
2	Number of participants who were evaluated in a follow-up and who implemented/adopted practices.
3	Number of volunteers that helped with program leadership or delivery.

Outcome #1

1. Outcome Measures

Number of participants who were evaluated and demonstrated increased knowledge and skills.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	44955

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

StrongWomen Program: Bone loss robs individuals of a healthy life. Fifty percent of women and up to 25% of men will suffer a fracture of the hip, spine, or wrist in a lifetime. Fractures cause pain, disability, and loss of independence. Twenty four percent of patients who suffer hip fractures die as a result of complications. Since Pennsylvania has the third highest percentage of elderly in the nation, education and prevention strategies are needed to reduce this burden.

Dining with Diabetes: Many people have Type 2 diabetes and don't know they have it. Over the past decade, the number of Americans who have been diagnosed with diabetes has increased by 61 percent and it is expected to more than double by 2050. Added to this alarming picture is that the Center for Disease Control reports that one out of three children who were born in 2000 will be diagnosed with diabetes during their life.

Children are unprepared to enter the workforce with the needed skills in science, engineering, technology, and math areas. Although formal education teaches many of the necessary concepts, they need to be reinforced through hands-on experiences and application to real world situations. In addition, children must learn the life skills necessary to be successful in the future workforce -- team work, responsibility, decision making, problem solving, and critical thinking to name a few.

Currently, more than 10,000 Pennsylvanians serve on 1,700 municipal and county planning commissions. Another 6,000-7,000 serve on zoning hearing boards or are involved in the day-to-day administration of some 1,600 municipal zoning ordinances. Many of these individuals are asked to serve on these boards and commissions and sometimes lack the knowledge to serve on these boards and commissions. The PMPEI planning and zoning courses provide the education that is needed for them to effectively serve on these boards and commissions.

What has been done

The StrongWomen program trains community site leaders who teach classes at the local level. The program combines safe, simple, and effective strength training and nutrition education to help women and men maintain significant muscle mass, gain bone strength prevent bone loss, and consume healthy foods. The program is built on 15+ years of scientific research at Tufts University.

The Dining with Diabetes program enhances knowledge to empower individuals to self-manage diabetes. Through nutrition education and information about important health numbers, participants applied new facts and meal strategies to improve their health.

The Pennsylvania 4-H Science program has developed curriculum to train professionals and volunteers on the science of inquiry. The 4-H Science team has worked to obtain grant funding (\$193,000) to support the implementation of the robotics curriculum and ensure appropriate adult training. New curriculum has also been developed to support water quality and quantity including two new helper guides. A grant was also received to support youth work linked to adult work already occurring on the Chesapeake Bay.

Municipal planning and zoning officials, as well as elected officials, who attend PMPEI courses learn how to carry out their planning responsibilities under the Pennsylvania Municipalities Planning Code (MPC); the fundamentals of developing a zoning ordinance using the authority granted under the PA MPC; the basic principles, procedures, and information needed to effectively carry out their functions in the administration of municipal zoning ordinances; and an understanding of the process of subdivision and land development approvals under the MPC.

Results

StrongWomen: 3,662 participants from 34 counties enrolled in the 12 week program. Data from 1,372 participants showed that 43% increased their intake in 1 to 3 categories and 24% increased their intake of nutritious food/nutrients in 4 to 6 categories. Food categories include increasing fruit and vegetable consumption, eating more whole grains and fibers, and consuming more calcium and vitamin D. Of the 229 continuing participants with a follow-up bone density test since beginning the program, 81.7% reported their bone density had increased or stayed the same, significantly reversing a typical aging decline in bone density.

Dining with Diabetes: The program reached 1,180 adults in 52 counties. Data from the program indicated that participants experienced statistically significant decreases in A1C, blood pressures, waist circumference, and triglycerides. Participant's responses showed 96% plan to use heart healthy cooking oil, 95% increased their knowledge of how to decrease sodium, 98% have a greater understanding of their role of fiber, and 85% have increased understanding of the role of calcium in the diet.

About 65,000 youth have been reached through 4-H science efforts working with 640 specially trained volunteers. Based on evaluations, about 7% of the youth indicated an increase in one or more of the science interest indicators and 71% indicated an increase in one or more of the science abilities. When compared to national evaluations, 91% of PA 4-Hers like science (61% nationally) and 82% believed science was useful for solving everyday problems compared to 67% nationally.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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134	Outdoor Recreation
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service
512	Quality Maintenance in Storing and Marketing Non-Food Products
607	Consumer Economics
608	Community Resource Planning and Development
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
704	Nutrition and Hunger in the Population
721	Insects and Other Pests Affecting Humans
723	Hazards to Human Health and Safety
801	Individual and Family Resource Management
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
805	Community Institutions, Health, and Social Services
806	Youth Development
903	Communication, Education, and Information Delivery

Outcome #2

1. Outcome Measures

Number of participants who were evaluated in a follow-up and who implemented/adopted practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	17864

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Dining with Diabetes: The prevalence of diabetes continues to increase in the United States. According to the Centers for Disease Control, diabetes affects 25.8 million people, or 8.3 percent of the U.S. population. What is equally concerning is that 7 million of these cases are

undiagnosed. Most people may not know they have diabetes or are at risk for diabetes until they experience complications associated with this disease.

What has been done

Affordable, accessible educational opportunities play an important role in informing the public of the risks associated with diabetes. The Dining with Diabetes program not only educates people with type 2 diabetes, but helps to identify at-risk adults, helping them to reduce their risk by encouraging them to make changes to their diet and physical activity levels and urging them to seek attention from their health care providers. In this state-wide program, positive behavioral changes are confirmed through surveys and biomarker testing and represent significant implications for healthcare savings for the state of Pennsylvania.

Results

Not only has the Dining with Diabetes program had a positive impact on biomarkers for diagnosed participants, but the program also addresses participants who were unaware that they were at a high level of risk for developing the disease. By the 3 month follow-up class, all participants experienced statistically significant change in nearly every measurement. Those diagnosed with diabetes significantly decreased their waistline circumference, systolic and diastolic blood pressure, A1C levels, and their triglycerides. High risk undiagnosed participants experienced a statistically significant drop in diastolic blood pressure, A1C, overall cholesterol, and LDL cholesterol.

4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service
512	Quality Maintenance in Storing and Marketing Non-Food Products
607	Consumer Economics
608	Community Resource Planning and Development
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
704	Nutrition and Hunger in the Population
721	Insects and Other Pests Affecting Humans
723	Hazards to Human Health and Safety
801	Individual and Family Resource Management
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
805	Community Institutions, Health, and Social Services
806	Youth Development
903	Communication, Education, and Information Delivery

Outcome #3

1. Outcome Measures

Number of volunteers that helped with program leadership or delivery.

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.)
- Other (Extramural Funding)

Brief Explanation

A significant reduction (19%) in State funding impacted both the research and extension functions of the College of Agricultural Sciences. The reduction in State appropriated funds resulted in retirements and layoffs of key faculty and staff, impacting all areas of the College. Due to the economic situation, numerous counties provided financial scholarships, reduced fees for returning participants, and alternative payment methods. Due to staff layoffs, some evaluation data is missing. With reduced funding, there are increased challenges to providing the program at a low-cost and be able to reach disparate populations. Due to state and local budget cutbacks, in the last several years the Commonwealth has significantly reduced the number of land use planning educational workshops it offers through several local government associations. This has left PMPEI as one of the primary sources for local officials to receive training on land use planning.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

StrongWomen: 67% (713 of 1056) of participants indicated they increased intake of nutritious foods and nutrients since starting the program; 95% (1020 of 1074) indicated that their health improved in 3 or more categories such as feeling physically stronger, doing everyday activities more easily, increased flexibility, improved balance, and improved weight since entering the program; 6.5% (88 of 1348) of the participants have decreased the amount medications they take for chronic diseases; 58.4% (787 of 1348) of participants' medications have stayed the same; and 229 participants have had a bone density test with 74 reporting an increase in bone density. Dining with Diabetes: Quantitative data from six self-administered surveys are entered into SPSS 17.0 for analysis. Data from identical

questions in the baseline and follow-up survey are paired and tested for significance. Data are compared, giving the ability to interpret the program's influence on individual and cumulative levels for a precise sense of impact. More Pennsylvania youth are becoming involved in 4-H science curricula and more collaborations are being built with schools and science-based industries to support that growth. In addition to the growth in science interest described above, 4-H members have participated in evaluations showing increases in decision making, problem solving, goal setting, communication, and critical thinking skills. These skills show a greater increase the longer youth are enrolled in the program.

Key Items of Evaluation

Participants in the StrongWomen program increased flexibility, relief of joint pain, improved balance, and improved weight; 95% (1020 of 1074) improved health in 3 or more categories since beginning the program; 6.5% (88 of 1348) of the participants have decreased the amount medications they take; 58.4% (787 of 1348) of participants' medications have stayed the same; and 229 participants have had a bone density test with 74 reporting an increase in bone density. Dining with Diabetes: Penn State Extension is successfully delivering an affordable, accessible diabetes education program for people with or at risk for type 2 diabetes. In the current economic climate, the need for delivering cost effective programming that yields a significant return on investment has never been more important. The Dining with Diabetes program has proven its effectiveness in impacting people already diagnosed with diabetes and has now established its evidence base as a useful program in prevention as well. Youth are developing science knowledge and life skills to support them in future career opportunities.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Natural Resources and Environment

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	10%		8%	
102	Soil, Plant, Water, Nutrient Relationships	15%		22%	
104	Protect Soil from Harmful Effects of Natural Elements	8%		1%	
112	Watershed Protection and Management	10%		12%	
121	Management of Range Resources	5%		0%	
122	Management and Control of Forest and Range Fires	8%		2%	
123	Management and Sustainability of Forest Resources	15%		16%	
124	Urban Forestry	10%		1%	
135	Aquatic and Terrestrial Wildlife	3%		21%	
136	Conservation of Biological Diversity	4%		6%	
141	Air Resource Protection and Management	5%		1%	
403	Waste Disposal, Recycling, and Reuse	5%		5%	
511	New and Improved Non-Food Products and Processes	2%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	31.0	0.0	38.0	0.0
Actual Paid Professional	27.3	0.0	67.0	0.0
Actual Volunteer	1.8	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
684146	0	504012	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1903893	0	4007335	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1312994	0	3037732	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Science-informed management and protection of natural resources are critical priorities to equip Pennsylvania citizens and private or public sectors to restore, improve, and sustain the health and well-being of water, land, air, flora, and fauna for the use and enjoyment of present and future generations. Pennsylvania's natural resources provide outstanding ecological and economic services to the regional and national basins and air sheds to which all of the state's activities on the landscape contribute and the human and non-human populations depend upon. Natural resource programs integrate research with innovative outreach to address the state's major pollution generating and natural resource threatening activities, including industrial activities, forest and agricultural production, energy exploration and production, and urbanization. Pennsylvania's land and water contributions influence the health of national priority watersheds such as the Chesapeake Bay, Great Lakes, and Mississippi River basins. Research programs address nonpoint and atmospheric source pollutants that contribute to the hypoxic zones. Growing pressures from land conversion activities within the Marcellus shale region of the state require proactive service to rural audiences who are positioned to make the land use decisions and trade-offs balancing demands with the needs to protect the layers of natural resources lying above the Marcellus shale including ground and surface water and forests supporting biologically diverse wildlife. Natural resources research programs address knowledge gaps that will result in improved water and terrestrial management. With a focus on natural resource management, the research is communicated to inform and improve management choices. Participants in natural resource programs collectively move the State toward improved and healthy waters, lands, forests, and wildlife. Programs strive to inform individual decisions that are made at the household, farm, or forest landowner levels relative to protecting private water supplies, forest lands, storm water runoff, water and energy demands, and intrinsic ecosystems such as vulnerable headwater streams, riparian buffers, and privately held green infrastructure. In addition, the natural resource manager is a critical audience who supports local decision making and practice implementation. Educating and supporting the decision maker is essential for sound and scientifically guided stewardship of natural resources. Penn State researchers assert that 70% of Pennsylvania's forests are privately owned and managed by independent decision makers. Likewise, individual landowners manage the lands from which the state's majority of headwater streams emanate, critical sources of the state's drinking water supply, sustaining critical baseline flows for aquatic habitat, as well as the water source supports wildlife and outstanding recreation and aesthetic value for Pennsylvanians.

2. Brief description of the target audience

Target audiences include farm managers, private forest owners, home owners, elected officials, state and local community leaders, municipalities, business professionals, civic groups, green industries, non-governmental organizations, policy makers, watershed associations, educators, and county, state, and federal agencies.

3. How was eXtension used?

Many Penn State faculty and educators are involved in several Communities of Practice (COP) related to Natural Resources and the Environment.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	19404	371261	7623	555

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

Patent Applications Submitted

Year: 2011

Actual: 3

Patents listed

Serial No: PCT/US2010/052504; Filed: 10/13/2010; Title: Composites Containing Polypeptides Attached to Polysaccharides and Molecules

Serial No: 12/903,942; Filed: 10/13/2010; Title: Composites Containing Polypeptides Attached to Polysaccharides and Molecules

Serial No: 61,487,769; Filed: 5/19/2011; Title: Electrified Trawling System

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	0	228

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of invention disclosures submitted.

Year	Actual
2011	3

Output #2

Output Measure

- Number of people enrolled and/or registered in programs.

Year	Actual
2011	27708

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants who were evaluated and demonstrated increased knowledge and skills.
2	Number of participants who were evaluated in a follow-up and who implemented/adopted practices.
3	Number of volunteers that helped with program leadership or delivery.

Outcome #1

1. Outcome Measures

Number of participants who were evaluated and demonstrated increased knowledge and skills.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	7161

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Natural resource and environment literacy, engagement, and improved management are the foci of extension programming. To this end, educators, practitioners, decision makers, youth, and the public-at-large are served through a suite of offerings that are delivered through a variety of mechanisms, including face-to-face, e-delivery, conference, field, and audio and print media. The endpoints are changed and intentional behaviors within the sphere of influence for which these audiences can work results in improved, sound natural resource and environment management. Landscape-based activities in Pennsylvania that threaten wildlife, water, and forests is the focus of extension programming on point source runoff (industrial operations, mining, impervious surfaces, ag and forestlands, homes and yards, roads, and commercial or municipal properties). These activities have impaired local surface and ground water quality, exacerbated stormwater volume and energy, and collectively diminished the quality of significant ecosystems such as the Chesapeake Bay and lower Mississippi River-Gulf of Mexico. Human health affected by drinking water quality and the environmental health of aquatic life and biodiversity are compromised by nonpoint source pollution with significant social, economic, and environmental costs to Pennsylvanians and their communities.

What has been done

Over 27,000 people participated in the suite of natural resource and environment programs on specific techniques and approaches to managing wildlife, wastes, water, and landscapes. Twenty-seven percent of the direct contacts were youth. An additional 371,261 indirect contacts were made (less than 1% of indirect were identified as youth). The programs taught and promoted practices, management, and implementation approaches for composting, mine-land reclamation, organic materials processing, early childhood intervention for nature studies, forest stewardship, PA Forest Stewards (PFS), forest health, forest harvest and re-generation, deer density, lumber grading and markets, special species of concern (amphibians, game birds,

biodiversity, wildlife damage, habitat fragmentation), community-based natural resources planning and sustainability, woodland and woodlot management, watershed and wetland protection, watershed planning and restoration, stormwater control, agricultural conservation for soil and water protection, improved conservation program delivery, emerging contaminants (i.e. pharmaceuticals), stream improvements, pond and lake improvements, aquatic plant control, nutrient and sediment reductions, drinking water assessment (testing) and interpretation, safe drinking water, Master Well Owner Network (MWON, volunteers) for groundwater (source drinking water) protection, and onlot septic systems. The programs were delivered through e-delivery (online short courses, webinars, consultation); face-to-face delivery in workshops, conferences, and local meetings; and through one-to-one technical assistance to the extent possible. Each of the deliveries included suites of programmatic materials including PowerPoint presentations, hands-on training exercises, print and social media, and science based technical support.

Results

With 7,161 participants evaluated, the results demonstrate an overall majority responding as having demonstrated increased knowledge and skills for the areas described in the "What is the Issue?" section above. Notably, adult leaders working with the 809 youth participating in the Junior Forest Steward program identified that 100% of the participants had a medium to large impact on the participating youth and rated the program in respect to usefulness as "9" on a 10-point scale. Likewise, 100% of participants evaluated in the wildlife management programs indicated that they gained knowledge that would improve their ability to sustainably manage their woodland habitat with 37% indicating they had learned a great deal to improve their management. Over 400 participants in regional woodland owner workshops indicated a moderate to considerable gain in new knowledge (78%) with 62% indicating that they would implement a sustainable forest practice and 33% indicating that they were already undertaking practices. Forest Web Seminars reached nearly 2,000 participants synchronously and 3,670 through self-study approaches. Ninety six of the 1,011 respondents indicated an increased knowledge based on participation and 90% indicated an expectation that they would implement. The water-based programs fared similarly whereby 88 to 100% of surveyed participants indicated an increase in knowledge. Participants in web-based program offerings universally indicated an expectation that they would implement practices learned through webinars. Field checked responses for the Pond and Lake Management program indicated that while 100% responded favorably to information gained, 33% took specific actions to better manage their pond/lake based on the water test results received. Especially critical for participants was the safe drinking water and testing programs, in which 54% of the 620 attendees received water test results indicating their water source had failed at least one safe drinking water standard. Of these, 296 attended a post program evaluation of which 197 (86%) had taken specific action to improve their water supply. One hundred percent of participants in this program indicated that they felt the assistance was helpful.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
121	Management of Range Resources
122	Management and Control of Forest and Range Fires

123	Management and Sustainability of Forest Resources
124	Urban Forestry
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
141	Air Resource Protection and Management
403	Waste Disposal, Recycling, and Reuse
511	New and Improved Non-Food Products and Processes

Outcome #2

1. Outcome Measures

Number of participants who were evaluated in a follow-up and who implemented/adopted practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	2762

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The 2,762 participants who were evaluated and indicated that they had undertaken specific actions to address natural resource management challenges were largely participants in the Safe Drinking Water program. To a lesser extent, the Pond and Lake Management, Pennsylvania Discovery Watershed, and Sustaining Pennsylvania Forests programs had follow-up evaluations that demonstrated how participant behavior had changed after knowledge gain. It is especially important to note that the audiences in the Safe Drinking Water Program are often seeking information based on the concern that their private water system may be tainted. Based on the results discussed in the section above, over 50% of the private supplies tested failed at least one drinking water standard. As such, there is a strong impetus (individual and family health) for taking action in response to the knowledge gained, especially given the high rate of water quality standards violated.

What has been done

The Safe Drinking Water program has encouraged residents who manage private water supplies to assess their water through a local water test lab or send it to the Penn State lab. Questions about the results are answered and water test interpretation clinics are held. Safe drinking water

clinics, gas well drilling and private water supply protection presentations, and onlot septic management workshops are offered both face-to-face and through e-delivery on a statewide basis. Ready access to technical assistance is broadened through the capacity provided by the Master Well Owner Network.

Results

Of the 611 residents who participated in one of the 18 water test interpretation workshops, 90% of the survey respondents indicated that they had taken actions on their water supply including water test interpretation and water testing. Overall, 87% of surveyed participants indicated that they planned to take an action to protect or improve their water quality.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
124	Urban Forestry
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
141	Air Resource Protection and Management
403	Waste Disposal, Recycling, and Reuse
511	New and Improved Non-Food Products and Processes

Outcome #3

1. Outcome Measures

Number of volunteers that helped with program leadership or delivery.

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.)
- Other (Extramural Funding)

Brief Explanation

A significant reduction (19%) in State funding impacted both the research and extension functions of the College of Agricultural Sciences. The reduction in State appropriated funds resulted in retirements and layoffs of key faculty and staff, impacting all areas of the College. The FRIT (Forest Resources Institute for Teachers) was cancelled in 2011 despite 10 years that the program had been successfully offered and evaluated as having provided significant information that has improved teacher and student performance. The cancellation took place in light of school districts not having budgets to support professional development activities in light of state cuts. Also, the state standards testing program was suspended due to state budget cuts, further reducing incentives for participation in the FRIT course. Additionally, the 4-H Nature Start program was diminished in its ability to reach the projected 30 counties that had expressed an interest in having the program in light of diminished youth educators (and adult volunteers) for carrying out the program. Grant funding will be paramount for the delivery of the Nature Start program in the future. Fall 2011 flooding was also an issue for delivery of wildlife, woodlot, forest stewardship, and educational programs in certain regions of the state, interfering with scheduled face-to-face sessions in particular. The granting cycles and delay in grant funding was also a factor for delivery of stormwater-related programs. Diminished resources for positions were also a strong factor in the outcome for many forest and natural resource based programs. Overall there is a sense that despite the pressures of the economic downturn, that certain programs are still sought by audiences who are willing to pay marginal fees, such as in the case of the Pond and Lake Management program. Interest in safe drinking water and the concerns about the threat of natural gas exploration and extraction in the Marcellus region to water quality has driven the demand for MWON programs. However, the state support for the program is flat and private water supply owners have traditionally been unwilling to pay more than \$5 for educational programs due to the perception that the provision of this service should be free of charge and publicly funded. The fall floods also increased the interest in private well management and sinkhole repair.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Discussed in the outcomes sections of this Planned Program.

Key Items of Evaluation

In 2010-2011, 809 youth across Pennsylvania participated in the Junior Forest Steward (JFS) program and 95% of these youth were reported by the adult volunteers working with them to have increased their knowledge "a lot" or "a great deal." These same volunteers also reported that the program made either a "large" long-term impact on the youth involved (60%) or a "medium" impact (40%). They rated the usefulness of the program materials highly (9 on a scale of 10; N=20). On a scale ranging from 1 (no new knowledge) to 5 (significant new knowledge), participants in Best Management Practices for Woodland Owners Associations Conference reported knowledge acquisition as 4.6. Similarly, PA Forest Stewards Basic Training reported knowledge acquisition as 4.6 during the second weekend of training in 2010. Training in 2011 occurred outside the reporting window. As a result of this program participation, attendees improved their ability to sustainably manage their own woodlots. Seventy-four percent of the evaluation respondents (N=251) indicated their skill or ability was either moderately or considerably improved. High school students (113 students) participated in one of three Envirothon Study Days on the topic of Estuaries. Of the 81% who completed a post survey, 96% indicated that the session helped them understand the issue and 88% indicated they would take at least one action to protect estuaries as a result of attending the session. A vast majority (93%) of participants implemented or adopted practices related to improving their effects on watershed condition, including participation in riparian buffer plantings, stream channel restoration, and water-use conservation practices. Of the 55 Storm Water Management Workshop participants, 95% felt the program was relevant, practical, and presented new ideas. Ninety-seven percent of the participants plan to use new storm water BMPs in the future, and 100% indicated intent to take some action. Furthermore, all of the participants indicated an increase in their knowledge and 95% found the information presented at the workshop to be of moderate to high usefulness.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Pest Management

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
211	Insects, Mites, and Other Arthropods Affecting Plants	8%		31%	
212	Pathogens and Nematodes Affecting Plants	13%		25%	
213	Weeds Affecting Plants	7%		5%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	7%		0%	
215	Biological Control of Pests Affecting Plants	12%		5%	
216	Integrated Pest Management Systems	28%		11%	
311	Animal Diseases	8%		16%	
404	Instrumentation and Control Systems	2%		2%	
901	Program and Project Design, and Statistics	8%		5%	
902	Administration of Projects and Programs	7%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	40.0	0.0	70.0	0.0
Actual Paid Professional	40.7	0.0	182.3	0.0
Actual Volunteer	65.3	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
954342	0	1866377	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1951636	0	6460415	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1311708	0	9662811	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Penn State's AES and CES conducted a wide range of programs related to effectively managing pests. Projects focusing on plant-biotic interactions were conducted in multiple horticultural and agronomic systems (turf, fruits, vegetables, grains, and beans) with a variety of pest species (bacteria, viruses, fungi, weeds, nematodes, and arthropods). The work ranged from field-based research to develop better strategies for forecasting pest outbreaks that can be incorporated into integrated pest management strategies to developing a fundamental understanding of these complex interactions to inform intelligent strategies for pest control. Sustainable approaches to manage pests were key features of many of our projects. Sustainable cropping systems that impact naturally occurring beneficial organisms can influence both native and applied natural enemies of insects. Research is also showing how a broad range of bacterial and fungal isolates serve as beneficial colonizers of plants to enhance productivity by both suppressing disease and improving crop nutritional status. Pheromone trapping networks throughout the State are helping growers assess the risk of two major lepidopteran pests of corn. Traps are monitored by county-based educators of Penn State's Crop Management Extension Group and data are deposited into the Pennsylvania Pest Information Platform for Extension and Education (PA-PIPE), which is an online early warning system that growers can consult to gauge pest activity levels. Additional outreach programs, such as the Master Gardener program, helped homeowners and other community members to manage pests in their gardens. The program team had direct contact with over 300,000 individuals and indirect contact with over 2 million. A group of experts also provided training on integrated pest management for orchard and vineyard growers. The team uses tools such as face-to-face meetings and written materials to educate this audience on best pest management practices and offers training to prepare individuals for the pesticide license exam. Animal health issues involving pathogenic interactions are also at the forefront of research and outreach activities. The Penn State Animal Diagnostic Laboratory, including the Poultry Diagnostic Laboratory, provides diagnostic services to a wide range of stakeholders to assist in timely and accurate animal disease diagnosis and to minimize economic losses. The laboratory has a variety of services including bacteriology, virology, pathology, and parasitology. Research projects on Bordetella-host interactions are increasing our understanding of bacterial pathogen interactions with vertebrate immune systems, leading to the development of control strategies against respiratory infections. Viruses such as Newcastle disease virus and rinderpest viruses are significant causes of disease in livestock. Nipah virus is of particular concern to both pigs and agricultural workers as the virus readily spreads and amplifies in pigs; direct contact with infected pigs is the primary source of human infections. Understanding the fundamental biology of these viruses will facilitate the development of antiviral drugs.

2. Brief description of the target audience

Target audiences include agricultural producers, private and commercial pesticide applicators, home owners, home gardeners, community garden managers, veterinarians, state and federal agency

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 personnel, public health agencies, diagnostic laboratories, and agribusiness professionals.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	330443	2156233	69507	360

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

Patent Applications Submitted

Year: 2011
 Actual: 2

Patents listed

Serial No: PCT/US2011/032087; Filed: 4/12/2011; Title: Strategies for the Transgenic Manipulation of Filamentous Fungi

Serial No: 100112892; Filed: 4/14/2011; Title: Strategies for the Transgenic Manipulation of Filamentous Fungi

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	0	297

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of invention disclosures submitted.

Year	Actual
2011	0

Output #2

Output Measure

- Number of people enrolled and/or registered in programs.

Year	Actual
2011	504637

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants who were evaluated and demonstrated increased knowledge and skills.
2	Number of participants who were evaluated in a follow-up and who implemented/adopted practices.
3	Number of volunteers that helped with program leadership or delivery.
4	Number of decision support tools adopted based upon predictive modeling research.
5	Number of diagnostic tools implemented or adopted for pest identification.

Outcome #1

1. Outcome Measures

Number of participants who were evaluated and demonstrated increased knowledge and skills.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1583

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The ability to properly identify and manage pests is critical to success in any agricultural business. Insect and other pests can greatly diminish production levels and decrease profitability for a commercial farm operation. For home gardeners, yield reduction due to pests can lead to greater costs of purchasing fruits and vegetables at a grocery store or other market. Therefore, it's important to manage pests at a low cost to optimize yields.

What has been done

Master Gardeners maintain a robust program of engagement that includes face-to-face presentations (233 presentations), community gardens (88 gardens), a Pollinator Friendly Certification Program (94 recipients), 16 people with one or more local newspaper articles, five blogs with over 57,000 page views, radio programs, and a phone hotline, etc. The orchard and vineyard sustainability team offered nine full-day programs and ten two-hour sessions in addition to newsletters, written materials, and web-based communications. Penn State also provided numerous educational sessions for continuing education of certified crop advisors.

Results

Of those evaluated through the Master Gardener program: 36% indicated that they increased knowledge and skills related to their selection of plants that are appropriate for their region; 20% increased their knowledge and skills related to fertilization; and 27% reported increased knowledge in selecting least toxic pest control methods. The orchard and vineyard team increased knowledge and skills in 95% of the audience. This related to topics such as fungicide resistance management, pruning, stone fruit bacterial diseases, and orchard nutrition.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
311	Animal Diseases
404	Instrumentation and Control Systems
901	Program and Project Design, and Statistics
902	Administration of Projects and Programs

Outcome #2

1. Outcome Measures

Number of participants who were evaluated in a follow-up and who implemented/adopted practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	162

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The ability to properly identify and manage pests is critical to success in any agricultural business. Insect and other pests can greatly diminish production levels and decrease profitability for a commercial farm operation. For home gardeners, yield reduction due to pests can lead to greater costs of purchasing fruits and vegetables at a grocery store or other market. Therefore, it's important to manage pests at a low cost to optimize yields.

What has been done

Master Gardeners maintain a robust program of engagement that includes face-to-face presentations (233 presentations), community gardens (88 gardens), a Pollinator Friendly Certification Program (94 recipients), 16 people with one or more local newspaper articles, five

blogs with over 57,000 page views, radio programs, and a phone hotline, etc. The orchard and vineyard sustainability team offered nine full-day programs and ten two-hour sessions in addition to newsletters, written materials, and web-based communications. Penn State also provided numerous educational sessions for continuing education of certified crop advisors.

Results

Within the Master Gardener program: 81% of respondents indicated that they would select species that are appropriate for local conditions; 49% said they would monitor pests more effectively; 54% said they would apply appropriate amounts of fertilizer; and 64% said they would use the least toxic pest control method. Also, between 95 and 100% of respondents (across different individual surveys) indicated that they would utilize advanced integrated disease/insect management strategies on their operations.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
311	Animal Diseases
404	Instrumentation and Control Systems
901	Program and Project Design, and Statistics
902	Administration of Projects and Programs

Outcome #3

1. Outcome Measures

Number of volunteers that helped with program leadership or delivery.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of decision support tools adopted based upon predictive modeling research.

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Number of diagnostic tools implemented or adopted for pest identification.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Appropriations changes
- Other (Extramural Funding)

Brief Explanation

A significant reduction (19%) in State funding impacted both the research and extension functions of the College of Agricultural Sciences. The reduction in State appropriated funds resulted in retirements and layoffs of key faculty and staff, impacting all areas of the College.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Of those evaluated through the Master Gardener program: 36% indicated that they increased knowledge and skills related to their selection of plants that are appropriate for their region; 20% increased their knowledge and skills related to fertilization; and 27% reported increased knowledge in selecting least toxic pest control methods. The orchard and vineyard team increased knowledge and skills in 95% of the audience. This related to topics such as fungicide resistance management, pruning, stone fruit bacterial diseases, and orchard nutrition. Within the Master Gardener program: 81% of respondents indicated that they would select species that are appropriate for local conditions; 49% said they would monitor pests more effectively; 54% said they would apply appropriate amounts of fertilizer; and 64% said they would use the least toxic pest control method. Also, between 95 and 100% of respondents (across different individual surveys) indicated that they would utilize advanced integrated disease/insect management strategies on their operations.

Key Items of Evaluation

Managing pests is a critical component of raising food and fiber. Penn State's CES programs target all growers, including home-based gardeners, in a direct way. We also provide indirect impact through training for pesticide applicators. This is a critically important aspect of production agriculture in a diverse state such as Pennsylvania.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Global Food Security and Hunger

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
606	International Trade and Development	35%		24%	
611	Foreign Policy and Programs	25%		55%	
722	Zoonotic Diseases and Parasites Affecting Humans	40%		21%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	9.0	0.0	7.0	0.0
Actual Paid Professional	2.4	0.0	31.1	0.0
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
66096	0	173468	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
200859	0	1114821	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
267521	0	2036895	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The College's International Agricultural Programs is involved in research and outreach in developing countries through multiple Collaborative Research Support Projects (CRSP) leveraged by our federal appropriations. One experiment in Latin America examined key agronomic features including plant growth characteristics, disease, symbionts, and foliage nutrient levels in broad bean, common bean, and quinoa. In the South Asia Region we continued IPM research and implementation in India, Nepal, and Bangladesh where IPM packages for several vegetable crops resulted in cost reductions of up to 60%. A workshop held in India, focusing on insect transmitted viruses, was broadly attended by scientists throughout Asia. Considerable progress was made on an exploratory grant for research collaboration in Thailand. A local outreach network provided accessible information that linked developing markets with a seed bank, local farmers, and non-commercial seed traders. Key seed traders and farmers were identified in regions of high species diversity and indigenous crop species along with cultural knowledge of these key crops was inventoried, resulting in broadening the distribution of underutilized indigenous crop species. Training is a key element to resolve the complex issues surrounding global food security and hunger. Penn State faculty worked in Serbia providing training and education in pest and disease monitoring networks, databases, and risk assessment tools. Programs such as the Cochran Exchange Fellowship and Borlaug Fellowship allowed us to host students from Egypt, Malawi, Vietnam, Namibia, and Zambia to study topics ranging from hardwood standards and utilization to food safety to plant breeding. Providing American students with the opportunity to work internationally is necessary for global efforts to ensure food security. Penn State students conducted research at collaborating universities in Spain and Brazil. Equally important are activities that occur within our State to ensure adequate, high quality food and services to the citizens of Pennsylvania. CES programs on Hunger Gardens, community food systems, Harvest 4-Health, economical nutrition, and food security focused programs contribute to this federal initiative. In addition to these programs, all our CES programs in Agricultural Systems and Pest Management contribute to this initiative. In order to reduce redundancy in reporting of appropriate numbers this year, we have included those numbers in their respective sections and are not reporting on some of the outcomes under this Planned Program. We will continue to focus resources on CES programs that complement the global initiatives of our research agenda.

2. Brief description of the target audience

Target audiences include agricultural producers, farmers, landowners, commodity organizations, agriculture services/businesses, nonprofit associations/organizations, community groups, consumers, general public, government personnel, human service providers, special populations (at-risk and underserved audiences), students/youth, volunteers/extension leaders, international agencies, international universities, international researchers, global populations, and local, state, and federal agencies.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1545	1200	120	0

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

Year: 2011
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	0	52

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of invention disclosures submitted.

Year	Actual
2011	0

Output #2

Output Measure

- Number of people enrolled and/or registered in programs.

Year	Actual
2011	1545

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants who were evaluated and demonstrated increased knowledge and skills.
2	Number of participants who were evaluated in a follow-up and who implemented/adopted practices.
3	Number of volunteers that helped with program leadership or delivery.

Outcome #1

1. Outcome Measures

Number of participants who were evaluated and demonstrated increased knowledge and skills.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of participants who were evaluated in a follow-up and who implemented/adopted practices.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of volunteers that helped with program leadership or delivery.

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
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Extramural Funding)

Brief Explanation

A significant reduction (19%) in State funding impacted both the research and extension functions of the College of Agricultural Sciences. The reduction in State appropriated funds resulted in retirements and layoffs of key faculty and staff, impacting all areas of the College. Reduced funding will limit the potential to deliver ReadyPA training to special populations and other preparedness educational programs. Natural and accidental disasters increase interest in Emergency Preparedness. Federal and State funding will limit program delivery.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluation of extension programs were a post evaluation after the educational activity. Most notable results were: 80% indicated that they will work with Penn State's CES again in the future, probably (47%), or will definitely look for opportunities (33%). Ninety-nine percent indicated that the information presented will help them become better prepared for an emergency. Ninety-two percent of the participants indicated that they would implement 3 or more actions as the result of this program.

Key Items of Evaluation

Most notable results were: 80% indicated that they will work with Penn State's CES again in the future, probably (47%), or will definitely look for opportunities (33%). Ninety-nine percent indicated that the information presented will help them become better prepared for an emergency. Ninety-two percent of the participants indicated that they would implement 3 or more actions as the result of this program.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Climate Change

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
103	Management of Saline and Sodic Soils and Salinity	15%		0%	
111	Conservation and Efficient Use of Water	15%		5%	
132	Weather and Climate	13%		3%	
133	Pollution Prevention and Mitigation	15%		55%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	15%		24%	
306	Environmental Stress in Animals	15%		1%	
605	Natural Resource and Environmental Economics	12%		12%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	21.0	0.0
Actual Paid Professional	2.7	0.0	18.2	0.0
Actual Volunteer	23.1	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
70073	0	578062	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
143647	0	1390140	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
131897	0	607059	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Climate change research and education has centered on the trade-offs and consequences of various management approaches for waste products, energy, water, land, soil, and forests. Ground-level air pollutants, including ozone, sulfur dioxide, nitrogen oxides, and nitrogen dioxide, at rural locations are being monitored during the growing season to evaluate the biological effects of these pollutants on different plant species. Environmental education translated from this research has served as the basis for workshops, classes, and a teaching module that demonstrates the effects of ozone on vegetation, especially plants that serve as sensitive bioindicators of ozone pollution. Carbon and nutrient cycling in the face of climate change are reflected in the root biology of woody species. Changing patterns in root growth and development in woody species are informing predictive models of how terrestrial carbon cycles increase or sequester atmospheric carbon dioxide. An important step in mitigating the effects of climate change is the acceptance and use of cleaner energy sources. A survey entitled "Willingness to Pay for Renewable Energy" demonstrated that Pennsylvania residents prefer cleaner energy sources (wind, hydro, solar, improved efficiency) over energy sources based on combustion. A changing climate also affects the management and restoration of water resources. A thermal monitoring network located in ten watershed sites recording stream and air temperature data informed riparian corridor planning and restoration projects to improve stream water quality as well as terrestrial and aquatic wildlife habitats. Acid rain, elevated carbon dioxide, and potential global warming are affecting the composition of regeneration in eastern deciduous forests. Although climate change appears to stimulate an overall increase tree growth, oak recruitment is declining with a concomitant increase in later successional tree species in temperate, eastern oak forests. A community-based environmental program "Managing Community and Urban Natural Resources" focuses on stewardship and management of urban forests (trees, parks, open spaces). This program provided individual technical assistance, workshops, presentations, webinars, research exchange, educational materials, and news sources. The program partners with USDA Forest Service, Pennsylvania Bureau of Forestry, TreePittsburgh, county planning offices, municipal staff and officials, nonprofits, and local citizens with special emphasis in the metropolitan areas of Pittsburgh and Philadelphia and ten other urban centers across the Commonwealth. Through assisting municipalities in the development of advisory committees called municipal tree commissions, natural resource-based plans and ordinances are developed and implemented that result in increased tree planting, inventory, and maintenance. The ecosystem services provided by improved urban forests include very tangible, local climatic controls through improved shade that mitigates urban heat islands, increased carbon uptake and sequestration, and myriad other services related to improved storm water control and water quality improvements.

2. Brief description of the target audience

Target audiences include commonwealth citizens, agricultural managers, elected officials, state and local community leaders, municipalities, business professionals, civic groups, green industries, non-governmental organizations, policy makers, watershed associations, educators, planning agencies, citizens groups and associations, farm and forest managers, conservation practitioners, agriculture and forest industry, energy customers, and regional, state, and federal agencies.

3. How was eXtension used?

Many Penn State faculty and educators are involved in several Communities of Practice (COP) related to Climate Change.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	9825	301808	0	0

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

Patent Applications Submitted

Year: 2011

Actual: 2

Patents listed

Serial No: PCT/US2011/032087; Filed: 4/12/2011; Title: Strategies for the Transgenic Manipulation of Filamentous Fungi

Serial No: 100112892; Filed: 4/14/2011; Title: Strategies for the Transgenic Manipulation of Filamentous Fungi

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	0	110

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of invention disclosures submitted.

Year	Actual
2011	0

Output #2

Output Measure

- Number of people enrolled and/or registered in programs.

Year	Actual
2011	5958

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants who were evaluated and demonstrated increased knowledge and skills.
2	Number of participants who were evaluated in a follow-up and who implemented/adopted practices.
3	Number of volunteers that helped with program leadership or delivery.

Outcome #1

1. Outcome Measures

Number of participants who were evaluated and demonstrated increased knowledge and skills.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	384

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

At the heart of climate change education is a growing interest across different groups for specific information that individuals can employ to reduce greenhouse gas emissions as well as to potentially be better positioned for future participation in carbon offset activities. Trees, parks, and open spaces have been an integral part of communities since the first American settlements, and they continue to have increasingly important impacts on human health and welfare, the overall quality of life, as well as a range of critical ecological services. Despite these long recognized values, public and private trees and landscapes are often undervalued or ignored and improperly managed in communities. This program delivers science-based and applied options for municipalities and communities to improve natural resource management at a local level that has tangible value to local residents and results in improved ecosystem services that result in local improvements while addressing broader ecological and economic challenges related to climate change.

What has been done

In partnership with municipal, state, and federal agencies, the program delivers a suite of educational offerings including: 1) face-to-face technical assistance (consulting) for municipal staff, elected officials, nonprofits, and agency staff. This includes site visits as well as consultation over the phone and internet (e.g. Philadelphia Department of Park and Recreation/Fairmount Park Commission). 2) Workshops across the Commonwealth (e.g. "Managing Municipal Stormwater," Arborist Short Course, Tree Tenders, and Community Tree Institute). 3) Talks at workshops and events hosted by others (e.g. PA Chapter of the American Society of Landscape Architects). 4) Webinars hosted by Penn State Extension and others (e.g. PA Boroughs Association). 5) Provision of extension materials developed by the program (e.g. Managing Natural Resources: A Guide for Municipal Commissions). 6) Provision of educational and research-based information developed by others. 7) Provision of materials through newsletters,

list serves, press releases, and other social/popular methods.

Results

Ninety percent of those evaluated identified that they had increased their knowledge and skills related to planning and managing community natural resources. They indicated intent to implement sustainable management and maintenance practices for community forests and indicated an overall appreciation for the ecosystem services provided by improved urban forests.

4. Associated Knowledge Areas

KA Code	Knowledge Area
103	Management of Saline and Sodic Soils and Salinity
111	Conservation and Efficient Use of Water
132	Weather and Climate
133	Pollution Prevention and Mitigation
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
306	Environmental Stress in Animals
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

Number of participants who were evaluated in a follow-up and who implemented/adopted practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	17

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The adoption and implementation of practices is a critical outcome of this program in respect to climate change mitigation through localized efforts. While all offerings through this program have the expectation that the enhanced knowledge of the audiences served will result in increased implementation of specific measures for improved natural resource management, only the

measurable activities are reported.

What has been done

Eleven municipal advisory committees were established and two large plans (Pittsburgh and Philadelphia Urban Forestry Master Plans) were completed. Seventeen smaller plans were also developed and completed. Ten ordinances related to natural resources were enacted.

Results

Inventories resulted in the location and evaluation of over 20,000 urban trees, twelve municipalities received grants for tree planting, inventory and maintenance in the order of \$478,445 that leveraged an additional \$478,445 in local cash and in-kind contributions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
103	Management of Saline and Sodic Soils and Salinity
111	Conservation and Efficient Use of Water
132	Weather and Climate
133	Pollution Prevention and Mitigation
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
306	Environmental Stress in Animals
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

Number of volunteers that helped with program leadership or delivery.

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.)
- Other (Extramural Funding)

Brief Explanation

A significant reduction (19%) in State funding impacted both the research and extension functions of the College of Agricultural Sciences. The reduction in State appropriated funds resulted in retirements and layoffs of key faculty and staff, impacting all areas of the College. The program partners significantly with federal, state, and local agencies to deliver its suite of programmatic offerings. It is important to note that the program's outcomes are synergistically driven by the multiple partners' efforts.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The integration of climate change sciences and outcomes into existing programs and the development of new programs require improved evaluation that will identify pre and post responses to information and monitoring for long term behavioral changes that result in improved environmental outcomes. The evaluations conducted as a part of this program provide an initial measure of implementation (30% responding that they have taken specific actions in response to the program), but the long-term monitoring is needed to ensure that the practices are successfully managed over time.

Key Items of Evaluation

While this year's programmatic focus for the climate change activities has been through the natural resources component of CES offerings, there are multiple arenas where climate sciences are being integrated including animal management systems within which emissions control and management are addressed. However, in respect to reaching a broad public with specific actions for climate mitigation, the natural resource management suite of offerings are the most tangible. Improved measurement of target audience response in the future will help to increase understanding of specific actions Commonwealth citizens are taking to increase the landscape capacity for carbon sequestration and other localized ecosystem benefits.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Sustainable Energy

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
125	Agroforestry	40%		35%	
131	Alternative Uses of Land	20%		37%	
202	Plant Genetic Resources	40%		28%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	2.0	0.0
Actual Paid Professional	13.4	0.0	20.9	0.0
Actual Volunteer	0.2	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
500266	0	204190	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1371299	0	552595	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
356140	0	1017001	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The development of Marcellus Shale natural gas reserves in Pennsylvania has resulted in a unique opportunity to develop a domestic energy resource in the state. In response, we have initiated a

comprehensive program to understand the potential community, economic, and/or environmental issues associated with the development of the Marcellus Shale resource. This has included the development of webinars, meeting conferences, newsletters, tours, gas leasing considerations, and factsheets on understanding the potential of the resource. Engagement with county commissioners, state government, and the industry is a critical part of the outreach effort. While natural gas is one of the energy alternatives for the state, renewable energy development that has minimal environmental impacts and limited effects on food and feed prices presents new opportunities and challenges. We are working to identify regionally adapted renewable energy solutions and develop the programs to foster the development of these technologies. Woody biomass from natural forests and woody energy crop plantations serves as an excellent source of lignocellulosic material, but its full utilization requires efficient bioconversion and fermentative processes combined with environmentally sensitive production methods and efficient supply chains. Handling of bulky cellulosic materials presents a bio-engineering challenge to reduce the volume of biomass feedstocks. Research initiatives also include evaluations of cropping systems on dairy farms, development of novel bioenergy crops such as jatropha, canola, and camelina, and development of sustainability criteria for harvesting crop residues. Alternative energy strategies are also a function of federal, state, and local policies that either subsidize or restrict development. Economic and policy considerations are being examined for the sustainable management of natural forests, woody energy crop plantations, and natural gas. Extension programs have been developed to address the potential of various alternative energy feedstocks for energy. One focus in our region is the development of biomass heating projects using woody biomass to displace heating oil and propane. The wood energy extension program team established the Northeast Wood Energy program, which developed a website, webinar series, educational materials, and a workshop/short course. The USDA Regional Project in Sustainable Wood Energy was created to synergistically grow the research, education, and extension communities in the region. Strategic technical support was provided to wood energy projects in the state, including the Smethport Woody Biomass Project, Penns Valley, and Greensburg Thermal. Faculty and extension staff members are also helping clientele understand emerging markets for ecosystem service credits that are often generated in conjunction with renewable energy project developments and are key components of the business plan. These include renewable energy credits, carbon credits, and nutrient trading credits.

2. Brief description of the target audience

Target audiences include general public, landowners, energy project developers, state and federal agencies, extension educators, state and local community leaders, energy companies, entrepreneurs, and researchers.

3. How was eXtension used?

Staff and faculty at Penn State utilized extension as a platform to develop some educational resources for renewable energy such as this article prepared on corn stover <http://www.extension.org/pages/26618/corn-stover-for-biofuel-production> and this article on corn cobs <http://www.extension.org/pages/26619/corn-cobs-for-biofuel-production>. We also contributed many articles on various ways to use energy such as this article on combustion <http://www.extension.org/pages/31757/using-combustion-heat-for-energy>. Our staff also contributed to reviews of online content and the planning of the development of various webpages. We have also used eXtension as a potential resource in the development of various research and outreach proposals.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	851197	1743827	178	340

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

Year: 2011
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	0	83

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of invention disclosures submitted.

Year	Actual
2011	0

Output #2

Output Measure

- Number of people enrolled and/or registered in programs.

Year	Actual
2011	874473

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants who were evaluated and demonstrated increased knowledge and skills.
2	Number of participants who were evaluated in a follow-up and who implemented/adopted practices.
3	Number of volunteers that helped with program leadership or delivery.

Outcome #1

1. Outcome Measures

Number of participants who were evaluated and demonstrated increased knowledge and skills.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1645

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The development of Marcellus Shale natural gas reserves in Pennsylvania has resulted in a large opportunity to develop a domestic energy resource in the state. But, there are a multitude of potential community, economic, and/or environmental issues associated with the development of the Marcellus Shale that need to be resolved. Renewable energy development that has minimal environmental impacts and limited effects on food and feed prices presents new opportunities and challenges for our clientele.

What has been done

Our extension teams have conducted webinars, meeting conferences, newsletters, tours, and factsheets on understanding the potential of the natural gas resource, gas leasing considerations, and other topics related to the development of the resource. They have conducted similar programs on renewable energy issues in the state. Engagement with county commissioners, state government, and the industry has been a critical part of the outreach effort.

Results

The Cooperative Extension Marcellus Shale Education Program has had widespread impacts on improving the skills of landowners in coping with this issue. For example, the program has improved participants confidence in the ability to make sound decisions pertaining to the leasing of oil and gas rights and understanding of the need to consult an oil and gas attorney before signing an oil and gas lease. Approximately 20% of landowner lease program attendees completed "after" meeting evaluations. When asked if they were better prepared to discuss a lease document, 90% indicated in the affirmative. Over 75% indicated they were more knowledgeable about the drilling process. The majority indicated the need to secure experienced legal advice. Landowners have reported significant dollar increases in the negotiated lease rates for their property as a result of attending Marcellus lease meetings. They have also indicated a

greater satisfaction with the non-monetary contract addendums that they negotiated with land lease agents.

4. Associated Knowledge Areas

KA Code	Knowledge Area
125	Agroforestry
131	Alternative Uses of Land
202	Plant Genetic Resources

Outcome #2

1. Outcome Measures

Number of participants who were evaluated in a follow-up and who implemented/adopted practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	21

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The development of Marcellus Shale natural gas reserves in Pennsylvania has resulted in a large opportunity to develop a domestic energy resource in the state. But, there are a multitude of potential community, economic, and/or environmental issues associated with the development of the Marcellus Shale that need to be resolved. Renewable energy development that has minimal environmental impacts and limited effects on food and feed prices presents new opportunities and challenges for our clientele.

What has been done

Our extension teams have conducted webinars, meeting conferences, newsletters, tours, and factsheets on understanding the potential of the natural gas resource, gas leasing considerations, and other topics related to the development of the resource. They have conducted similar programs on renewable energy issues in the state. Engagement with county commissioners, state government, and the industry has been a critical part of the outreach effort.

Results

The Cooperative Extension Marcellus Shale Education Program has had widespread impacts on improving the skills of landowners in coping with this issue. Responding to a long-term evaluation instrument nine months after the webinar, 90% indicated they had a better idea of the impact the natural gas industry could have on their business and 55% indicated they had made changes in their business. Responding to the short term business webinar evaluations, 58% indicated that as a result of participating in the webinars, they had established contacts within the natural gas industry. Reacting to new information and a better understanding of the opportunities that exist, 48% said that they had modified their business plans to accommodate this new enterprise.

4. Associated Knowledge Areas

KA Code	Knowledge Area
125	Agroforestry
131	Alternative Uses of Land
202	Plant Genetic Resources

Outcome #3

1. Outcome Measures

Number of volunteers that helped with program leadership or delivery.

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.)
- Other (Extramural Funding)

Brief Explanation

A significant reduction (19%) in State funding impacted both the research and extension functions of the College of Agricultural Sciences. The reduction in State appropriated funds resulted in retirements and layoffs of key faculty and staff, impacting all areas of the College. Public interest in either the Marcellus or renewable energy strategies is tied closely to the economy and public policy. Increases in economic activity and energy prices could greatly increase the interest in the development of these resources and the potential for secondary issues to develop. Likewise, decreases in natural gas prices could slow development and decrease the perception of the importance of investment in renewable energy. The popular media of radio, television, and newspaper have devoted

dedicated reporters and industry segments to the drilling activity. They interview landowners, business people, legislators, and special interest groups to report activity. This report timeline and program activities reflect a general increase in knowledge by the community and the increase in drilling activities as a result of the nation's economy. Local communities are becoming more engaged in decision-making and the consideration of ordinances. Considerable discussion is taking place on the local level as municipal officials discuss their options for some local regulation. Much of this is initiated by community residents. PA DEP has increased staff and fees and landowners are increasingly receiving bonus and royalty income. These factors have driven our program activities and subject areas to meet the needs of clients. An example is the "Financial Considerations" workshops conducted to assist landowners receiving or planning to receive bonus and/or lease payments. Both of these industries are also closely tied to public policy and development is a function of tax, subsidy, and environmental policy. Changes in any policy often require subsequent interpretation and education and create additional opportunities for engagement through extension. These changes also create opportunities for public policy research on energy policy, which is also a strength of the AES.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Approximately 20% of landowner lease program attendees completed "after" meeting evaluations. When asked if they were better prepared to discuss a lease document, 90% indicated in the affirmative. Over 75% indicated they were more knowledgeable about the drilling process. The majority indicated the need to secure experienced legal advice. Responding to the short term business webinar evaluations, 58% indicated that as a result of participating in the webinars, they had established contacts within the natural gas industry. Reacting to new information and a better understanding of the opportunities that exist, 48% said that they had modified their business plans to accommodate this new enterprise. Responding to a long-term evaluation instrument nine months after the webinar, 90% indicated they had a better idea of the impact the natural gas industry could have on their business and 55% indicated they had made changes in their business.

Key Items of Evaluation

Our evaluations indicate that a carefully planned extension program can help the public better cope with the complex issues surrounding energy development and help individuals maximize the returns associated with natural gas development on their property. Extension professionals can also play a key role to inform public officials so they can make better decisions related to public policy.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Childhood Obesity

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior	85%		48%	
724	Healthy Lifestyle	10%		0%	
802	Human Development and Family Well-Being	5%		52%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	14.0	0.0	3.0	0.0
Actual Paid Professional	18.6	0.0	2.9	0.0
Actual Volunteer	0.3	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
141121	0	13456	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
464541	0	221087	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
716469	0	25710	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Penn State Extension Family Fitness program is delivered to children ages 8 to 12; the classes meet for 1.5 hours for nine sessions either weekly or bi-weekly and parents/families meet for five sessions, three jointly. The program offers help to all children ages 8-12 and their families' need for improving healthier food and fitness behaviors and family communication. A four-part, learn-at-home newsletter series for families to work on together is offered. Children attend nine weekly sessions to practice making healthy food choices and increase physical activity. Parents and children participate to receive information, skills, and motivational guidance leading to improved family food choices and physical activity. Family Fitness Educator trainings are offered to community educators and teachers to increase program reach. The Up for the Challenge curriculum is offered as a training through teacher workshops and was used in after-school programs, 4-H, and camps for youth to improve healthy eating and physical activity knowledge and behaviors. The Penn State Intergenerational Program expanded the concept of family to include intergenerational approaches to nutrition education. Novel intergenerational program models derived from pilot studies were presented at the Society of Nutrition Education annual conference and an all-day forum co-sponsored by the Administration for Children and Families and Generations United. These presentations incorporated multi-disciplinary approaches to introduce strategies that will assist family members to achieve healthy eating goals. The Penn State's Relatives as Parents program conducted four kinship family simulation workshops and a series of educational workshops with the goal of raising service providers' awareness of the issues encountered by relative caregivers, especially grandparents, and the connections to appropriate services for child welfare.

2. Brief description of the target audience

Target audiences include teachers, community caregivers, child care providers, students/youth, youth organizations, nonprofit associations/organizations, community groups, general public, human service providers, intergenerational families, relative caregivers, and vulnerable children professionals.

3. How was eXtension used?

eXtension is used as a reference by extension educators and clientele. As it becomes more developed, it is becoming more useful. With the links to the USDA My Plate, the Interactive Tools, and news releases, the educators have more helpful information to use in their programs.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	120	1016	2723	900

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

Patent Applications Submitted

Year: 2011
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	0	19

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of invention disclosures submitted.

Year	Actual
2011	0

Output #2

Output Measure

- Number of people enrolled and/or registered in programs.

Year	Actual
2011	5894

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants who were evaluated and demonstrated increased knowledge and skills.
2	Number of participants who were evaluated in a follow-up and who implemented/adopted practices.
3	Number of volunteers that helped with program leadership or delivery.

Outcome #1

1. Outcome Measures

Number of participants who were evaluated and demonstrated increased knowledge and skills.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	131

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The percentage of children overweight and obese has quadrupled in the past thirty years for children ages 6-11, so the need for successful research-based interventions is urgent. Childhood overweight has been documented to increase the risk for cardiac disease and its risk factors -- hypertension, type II diabetes, and high cholesterol for children, adolescents, and adults. Overweight and obesity, and their associated health problems, have a significant economic impact on the U.S. health care system.

What has been done

Extension Educators trained parents, teachers, and children in Healthy Lifestyles programs in classrooms, summer camps, and after school programs. The Family Fitness program was run in five PA counties (Fayette, Luzerne, Snyder, Northumberland, and Columbia) in after school programs, summer day camp, and YMCAs at nine program sites reaching 21 parents and 176 youth. The Family Fitness Educator training was offered in three PA counties (Fayette, Blair, and Snyder) and in Houston, Texas for the Santa Maria Hostel for families (provided by a grant) to 34 extension educators, family counselors, teachers, school nurses, YMCA trainers, and family literacy trainers. The Up for the Challenge program was run in Northumberland, Mifflin, Columbia, Huntington, Monroe, Lehigh and Juniata counties at ten sites, including summer camps, after school community centers, teen detention centers, and YMCAs.

Results

Extension Educators trained a total of 5,883 parents, teachers, and children in Healthy Lifestyles programs in classrooms, summer camps, and after school programs. The Family Fitness program was run in five PA counties (Fayette, Luzerne, Snyder, Northumberland, and Columbia) in after school programs, summer day camp, and YMCAs at nine program sites reaching 21 parents and 176 youth. The Family Fitness Educator training was offered in three PA counties (Fayette, Blair,

and Snyder) and in Houston, Texas for the Santa Maria Hostel for families (provided by a grant) to 34 extension educators, family counselors, teachers, school nurses, YMCA trainers, and family literacy trainers. The Up for the Challenge program was run in Northumberland, Mifflin, Columbia, Huntingdon, Monroe, Lehigh and Juniata counties at ten sites, including summer camps, after school community centers, teen detention centers, and YMCAs, reaching 354 youth.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle
802	Human Development and Family Well-Being

Outcome #2

1. Outcome Measures

Number of participants who were evaluated in a follow-up and who implemented/adopted practices.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of volunteers that helped with program leadership or delivery.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Appropriations changes
- Government Regulations
- Competing Programmatic Challenges
- Other (Extramural Funding)

Brief Explanation

A significant reduction (19%) in State funding impacted both the research and extension functions of the College of Agricultural Sciences. The reduction in State appropriated funds resulted in retirements and layoffs of key faculty and staff, impacting all areas of the College. There are many challenges in conducting this program since there are not sufficient grant dollars or income from schools or extension to hire program assistants to conduct the program in more than a few counties. The families most at risk for being overweight are low-income, so they do not have extra income to cover program costs. During winter months in PA, schools may close, which disrupts the schedule for extension classes held in the schools. Schools typically will not allow programs to be held in their

schools until their required state mandated tests have been completed, which means that extension programs are offered later in the school year. Schools have tight budgets and are becoming more limited in their ability to pay for the program so there is great need for grants and sponsorships to support the programs that are offered by extension and other organizations. Since many programs are run in spring and summer, follow-up is difficult to obtain and most would fall in the next program year and most of the groups such as school groups are not still together. Additionally with reduced staff and staff layoffs, it is more difficult to run programs, due to time involved in running other programs. We couldn't obtain all results from those staff laid off.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

- **Healthy Eating:** 90% (n=10) of youth improved in one or more diet behaviors; 40% (n=10) of parents increased knowledge of the Nutrition Fact Labels; 40% (n=10) parents increased/improved using Nutrition Facts labels to help with food purchase; 80% (n=10) of youth increased willingness to try new vegetables; 50% of youth increased eating three or more vegetables daily; 30% of youth increased eating two or more fruits; 30% of youth increased eating whole grains; 70% of youth decreased high sugar foods or drinks; 47% of youth increased use of Nutrition Facts labels to decide whether to eat a food; 34% (n=95) of youth increased knowledge of foods high in calcium; 76% (n=95) of youth increased knowledge in number of minutes for healthy physical activity; and 76% (n=95) of children increased willingness to eat new foods.
- **Family Communication:** 67% (n=10) increased planning meals together; 44% of families increased family meal preparation; 30% increased eating meals together; 40% of families improved agreement about eating healthy foods; 20% of families improved agreement about physically activity; and 30% increased healthy eating goal setting.
- **Physical Activity:** 80% (n=10) of families increased any kind of physical activity; 40% (n=10) of youth increased enjoyment of physical activity; 40% (n=10) of families increased enjoyment of physical activity; 40% (n=10) of children were willing to try new physical activities; 50% of families increased walking; 67% increased other physical activity; 35% of children decreased minutes of TV; 27% (n=95) decreased computer game time; 48% (n=95) of youth increased physical activity intensity (heartbeat fast, breathe hard 20+ minutes over past week vs. pre-program); and 51% (n=95) increased knowledge of bone-building activities.
- **Educator Training:** 90% (n=34) said they would be confident in offering the program in their facilities and would plan to offer the program in the next 3-12 months.

Key Items of Evaluation

- **Healthy Eating:** 90% (n=10) of youth improved in one or more diet behaviors; 80% (n=10) of youth increased willingness to try new vegetables; 50% of youth increased eating three or more vegetables daily; 70% of youth decreased high sugar foods or drinks; 76% (n=95) of children increased willingness to eat new foods; and 60% (n=120) are consuming five or more serving of fruits and vegetables.
- **Family Communication:** 67% (n=10) of families increased planning meals together.
- **Physical Activity:** 80% (n=10) of families increased any kind of physical activity; 48% (n=95) of youth increased physical activity intensity (heartbeat fast, breathe hard 20+ minutes over past week vs. pre-program); 50% (n=120) improved in being physically active 60+ minutes daily; and 67% (n=84) set physical activity goals.

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Food Safety

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	40%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	60%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	7.0	0.0
Actual Paid Professional	14.7	0.0	7.1	0.0
Actual Volunteer	0.4	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
483528	0	146737	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1304965	0	575512	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
330726	0	301519	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Emerging technologies are the cornerstone of food safety research and outreach at Penn State. New methods of detecting pathogens are assisting processors in developing control measures for pathogenic *E. coli* in beef products and processing plants. Similarly, methods to subtype specific strains of *Salmonella* will allow accurate tracking of contaminated eggs and chicken meat. Long-term survival of *Listeria monocytogenes* enables the organism to rapidly adapt to specific niches, increasing its transmission to food. A novel molecular-genetic model explaining how *Listeria* rapidly adapts to different foods and food processing facilities will inform new control measures. Alternative control measures, such as the indirect application of antimicrobial compounds incorporated in packaging films effectively controls food borne pathogens like *Listeria* on ready-to-eat foods. Non-thermal treatments of food products are also being employed as methods to control food pathogens. Milk treated with ultrasound waves inactivates *E. coli* or *Listeria*, and the application of hydrostatic pressure is an effective intervention against *E. coli* in fresh ground beef. Food safety activities developed from research-based programs were delivered to different constituents throughout the food chain, from field to consumer. Food Safety Manager Certification provides training to the retail and foodservice sectors. The ServSafe curriculum was delivered through in-class training by certified extension educators as well on on-line through TAP Series, a Penn State approved on-line training program. Both training programs administered by extension educators, provided participants with food safety information needed to pass Food Safety Certification Exam. Volunteer Food Safety Training program is a three hour face-to-face workshop that provides the basics of food safety for volunteer organizations that serve food, including those handling food donations such as food banks. Industrial food safety training programs trained food manufacturing employees. Hazard Analysis Critical Control Point (HACCP) Training certified through the International HACCP Alliance provides a risk based control approach to ensuring safety in food production. Customized food safety training was also delivered to meet the needs of industry sectors including meat and poultry, mushroom, and dairy. Food safety information was made available through the Penn State Food Safety Website and the Penn State Food Safety Listserv. For consumers, home food preservation training at workshops or exhibits at farmers markets and fairs as well as through the Penn State's Home Food Preservation website provided scientifically developed methods for preserving food by consumers through pressure cooking, drying, and freezing. The Penn State Food Safety Team provided statewide coverage to field calls from consumers and information on food safety basics to consumers through social networking and traditional print media. Good Agricultural Practices (GAPs) disseminated through workshops and a GAP website provided on-farm food safety protocols for growers to prevent contamination of fruits and vegetables.

2. Brief description of the target audience

Target audiences include human service providers, managers and volunteers of non-profit organizations, community groups, general public, animal producers, state and local government employees and agencies, youth, produce growers, and owners, operators, managers, and employees of retail and food service or production operations.

3. How was eXtension used?

eXtension is used as a reference by extension educators and clientele. As it becomes more developed, it is becoming more useful. With the links to news releases, frequently asked questions, and teaching modules, the educators have more helpful information to use in their programs or to refer to clientele.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12619	2571023	1	0

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

Patent Applications Submitted

Year: 2011

Actual: 1

Patents listed

Serial No: 61/541,554; Filed: 9/30/2011; Title: Rapid, Specific and Sensitive Immunoassays for the Detection of Highly Variable Gram Negative Bacterial Antigens

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	0	19

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of invention disclosures submitted.

Year	Actual
2011	0

Output #2

Output Measure

- Number of people enrolled and/or registered in programs.

Year	Actual
2011	10590

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants who were evaluated and demonstrated increased knowledge and skills.
2	Number of participants who were evaluated in a follow-up and who implemented/adopted practices.
3	Number of volunteers that helped with program leadership or delivery.

Outcome #1

1. Outcome Measures

Number of participants who were evaluated and demonstrated increased knowledge and skills.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	3505

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to the Centers for Disease Control (CDC), there are 48 million cases of foodborne illness that occur each year with 240,000 of those resulting in hospitalization and 3,000 in death. All illnesses are due to five primary causes occurring in the food chain. According to the Food and Drug Administration (FDA) and USDA, the agencies responsible for food safety, education of individuals who prepare and handle food, including consumers, is the key in prevention of foodborne illness. Through the use of researched based educational programs, educators can provide critical information on best practices for food safety to those who prepare and handle foods.

What has been done

Using different research-based food safety curriculum, educators were able to provide critical food safety information to individuals throughout the food chain. Over 12,000 individuals were directly impacted by Penn State Extension, and even a larger number, over 2 million, through indirect means. This includes over 4,000 foodservice and retail professionals, over 1,000 food industry professionals, and 1,000 food handlers who work with non-profit associations.

Results

As an indicator of program effectiveness, post evaluations indicate that the vast majority (>98%) of individuals increased knowledge for each of the program areas. The majority (>60%) indicated that they had moderate to high level of information gain. With the retail/foodservice sector, 84.55% of participants surveyed indicated that they plan to implement one or more practices. Results were similar with consumer based training (Home Food Preservation with 89% indicating they would use approved preservation methods) and with volunteers (Cooking for Crowds with 84% indicating they would use one or more of the practices). These practices included proper cooling and cooking of food, the use of calibrated temperature monitoring devices, and proper

cleaning including hand washing.

4. Associated Knowledge Areas

KA Code	Knowledge Area
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #2

1. Outcome Measures

Number of participants who were evaluated in a follow-up and who implemented/adopted practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	222

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Follow-up evaluations help Food Safety Educators determine whether the food safety educational information presented is being used by the individuals who received the training. It assures that the training and educational information is being retained, understood, and practiced.

What has been done

Follow-up evaluations were completed 3 to 6 months after taking food safety courses to ascertain the impact of the training on continued practice. Evaluations were completed for the Volunteer Food Safety, Home Food Preservation, and Food Safety Manager Training programs. The evaluation looked at improved practices including using a calibrated thermometer, cooling and cooking foods properly, and practicing proper personal hygiene.

Results

Eighty-four Volunteer Food Safety participants completed three to six month follow-up evaluations showing that 60% of these participants have implemented at least one new practice, 48% have implemented up to three new practices, and 70% have increased the frequency of at least one

practice. Fifty-five individuals completed follow-up surveys after completing Home Food Preservation training show that 91% had taken at least one new action and 45% had completed up to four new actions. One hundred sixty-three Food Safety Certification Manager training participants completed a follow-up evaluation and all respondents reported to have changed or increased an established practice as a result of attending the Penn State class.

4. Associated Knowledge Areas

KA Code	Knowledge Area
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #3

1. Outcome Measures

Number of volunteers that helped with program leadership or delivery.

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
- Other (Extramural Funding)

Brief Explanation

A significant reduction (19%) in State funding impacted both the research and extension functions of the College of Agricultural Sciences. The reduction in State appropriated funds resulted in retirements and layoffs of key faculty and staff, impacting all areas of the College. In addition, there are a number of external factors which impacted current demand and are posed to increase the demand of food safety training in future. First is the public attention to food safety. There have been increased outbreaks and recalls reported in the news and this has put pressure on companies to learn best practices in producing safe foods. Second, and related to the first, is increasing government regulations, as directed by both the FDA (new Food Safety Modernization Act) and the USDA (for example, the changing regulations related to STEC E. coli). Lastly, natural disasters - Pennsylvania was ravaged by flood this year and there were a number of issues regarding food safety faced by farmers, food establishments, and consumers. The economy had an impact as people looked to alternate sources of food including preserving their own food, or relying on donated food.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Food safety is a high priority issue in Pennsylvania and Penn State's AES and CES plays a key part in providing needed education and research. Evaluation results indicate that the training and research provided by extension faculty and educators has a large impact on improving the food safety handling and preparation practices used by constituents in every part of the food chain. By using a research based approach, individuals and their companies or organizations receive information that is considered best practice. Results indicate that people are learning new information they did not know prior to taking the extension classes and then are implementing facets of this training in their operation. Our high phone call and email volume and high visitation rate to Penn State Food Safety websites, indicate that people value Penn State Extension as an important source of food safety information.

Key Items of Evaluation

The impact of Penn State Food Safety Programs goes well beyond the individuals directly trained by the program. Foodservice managers who attend Food Safety Manager Training classes indicate that they serve, on average, close to 200,000 customers per year. Penn State faculty and staff offered 25 different industrial food safety training events reaching 756 food industry professionals and 200 companies. Of these, 166 participants received HACCP training and became certified, representing 90 different food processing companies. With an estimated 50 employees per company, all food industry training efforts supported more than 10,000 food processing jobs, tens of millions of consumers who consumed products produced by those companies, and the local economies where those processing facilities are located.

Faculty, staff, and extension educators responded to thousands of calls and emails from food professionals and consumers with regard to the safe handling and preparation of food. A food safety website, three food safety listservs, two blogs, and a Facebook page are maintained to provide industry, educators, regulators, and consumers with up-to-date information. The food safety website is listed as one of the most active websites in the college. The food safety listservs reach over 400 industry professionals. Articles written for various food industry publications and news releases in general newspapers reached over an estimated 2 million people in the reporting period.