

2012 Pennsylvania State University Combined Research and Extension Plan of Work

Status: Submitted

Date Submitted: 04/15/2011

I. Plan Overview

1. Brief Summary about Plan Of Work

The College of Agricultural Sciences at Penn State University provides comprehensive support to the residents of Pennsylvania through the activities of the Pennsylvania Agricultural Experiment Station (AES) and Penn State Cooperative Extension (CES). We are responsive to stakeholder needs through translational research and delivery of science-based programs to clientele, but we also conduct internationally-relevant fundamental research that will generate baseline data to solve future problems and actively seek new and better ways to communicate our programs to audiences whom we have not reached in the past. Our faculty and staff supported by federal base funding effectively leverage this investment against many other funding sources to conduct programs of the highest caliber. We are committed to excellence in research, educating the next generation of agricultural professionals and citizens, and promoting life-long learning among the citizens of Pennsylvania. Our College's strategic plan is clear: "The mission of Penn State's College of Agricultural Sciences is to discover, integrate, and disseminate knowledge to enhance the food and agricultural system, natural resource and environmental stewardship, and economic and social well-being, thereby improving the lives of people in Pennsylvania, the nation, and the world."

The college's current strategic plan (http://strategicplanning.cas.psu.edu/2008_2013/PDFs/CAS_2008-2013_Strategic_Plan.pdf), which was developed in 2008 following a broad (internal and external) stakeholder-driven process, provides a useful backdrop to our joint research-extension Plan of Work. To achieve our vision, we recognize that the college must move toward an approach where research, resident education, and extension/outreach activities are organized around three dominant and interrelated systems - food and fiber, ecosystems, and socioeconomic systems. Within these three systems, we have identified five strategic initiatives - entrepreneurship, energy, water, pest prediction & response, and food, diet, & health. We are now in the process of implementation - tempered by budget realities - of these initiatives. The nine planned programs described in this Plan of Work build from the framework of this strategic plan and the systems approach that we have identified as a key element for generating impact.

The current focus on the health of the Chesapeake Bay and questions being raised across the Appalachians about extraction of natural gas from the Marcellus Shale deposits serve as reminders of the value of natural resources in Pennsylvania. Our production of food, fiber, and fuel must balance the need for diverse, safe, and affordable food with protection of environmental quality. We are engaged in demonstrating best practices and disseminating these among farmers and conservation partners, but new technologies are needed. Pennsylvania agriculture is dominated by livestock production, and this agricultural portfolio is under pressure from both the water and air quality perspectives and the competition for alternative land uses with a "suburbanizing" population. These conflicts require research and education.

Our planned programs capture the systems thinking articulated in our strategic plan and tie directly to key national emphasis areas identified by USDA-NIFA. Our programs cut across disciplines and unite our research efforts with our extension education capacity. Penn State has the good fortune of providing an environment that encourages interdisciplinary work and values outreach to stakeholders. The University has built a framework of university-wide consortia and institutes (Life Sciences; Energy and Environment;

Social Sciences - Children, Youth, and Families; Materials), and the College of Agricultural Sciences plays an integral role in these organizations. This interdisciplinary philosophy has reinforced the natural tendency of our faculty and extension educators to work cooperatively to solve problems. Coupled with the joint research-extension appointments of many of our College faculty, our work, as represented in this Plan of Work, effectively unites fundamental knowledge with practical solutions delivered to stakeholders. The net result is a tangible benefit in economic prosperity and quality of life for Pennsylvania citizens.

Estimated Number of Professional FTEs/SYs total in the State.

| Year | Extension | | Research | |
|------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| 2012 | 390.0 | 0.0 | 264.0 | 0.0 |
| 2013 | 390.0 | 0.0 | 264.0 | 0.0 |
| 2014 | 390.0 | 0.0 | 264.0 | 0.0 |
| 2015 | 390.0 | 0.0 | 264.0 | 0.0 |
| 2016 | 390.0 | 0.0 | 264.0 | 0.0 |

II. Merit Review Process

1. The Merit Review Process that will be Employed during the 5-Year POW Cycle

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

2. Brief Explanation

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

As discussed in the "Stakeholder Input Process" section, all cooperative extension state planning efforts are thoroughly grounded in the needs identified during our statewide needs assessment process (<http://www.extension.psu.edu/internal/FocusPOW.pdf>). After the needs assessment and program identification process was completed, each of the identified programmatic issues was assigned to an integrated, multidisciplinary Natural Work Groups (NWGs) composed of field-based extension educators and faculty with joint appointments in both extension and research efforts. Team members from field operations were chosen to broadly represent all regions of the Commonwealth, and faculty members were chosen to represent the research and extension perspectives of all relevant disciplines. State Program

Leaders provide overall leadership to teams with regional and state administrators and academic unit leaders serving in liaison roles to each NWG. All of the programs have been reviewed by research and/or extension administrators. Additionally, logic models were developed by each NWG to guide the programming efforts of field-based educators and faculty members with extension appointments, and they contribute to applied research priorities.

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 NWGs or agricultural experiment station projects are implemented, stakeholder groups and/or program advisory groups will 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. Ag Council and Cooperative Extension Council members and other stakeholders are being considered to serve in an advisory capacity for extension teams.

Through the evaluation process that is part of the logic model, feedback from stakeholders provides areas where applied research is needed. In addition, after resources have been identified to direct extension program areas where limited knowledge occurs, fundamental and applied research are identified to be carried out during the period of the program. Fundamental research is largely driven by availability of extramural funding sources and the peer review process associated with that funding.

III. Evaluation of Multis & Joint Activities

1. How will the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?

The planned multi and joint activities conducted at Penn State address issues that have been identified through the planning process and through needs assessments in collaboration with cooperative extension, the agricultural experiment station, and/or resident education faculty and audiences. In addition, multi and joint activities are conducted within the framework of the College of Agricultural Sciences five-year strategic plan (http://strategicplanning.cas.psu.edu/2008_2013/PDFs/CAS_2008-2013_Strategic_Plan.pdf), which identifies areas of critical needs at the state level. The college strategic priorities determine our faculty hires and program fund allocations for each of these issue areas and faculty develop their educational and research programs on the basis of these critical issues.

The agricultural system spans the farm to fork spectrum in Pennsylvania. The critical issues involve creation and dissemination of new knowledge that helps the Pennsylvania agricultural industry capture more value-added aspects of commodities produced in the Commonwealth. Plants with new traits that result in local adaptation, pest resistance, and improved nutritional and biomaterial (including bioenergy) characteristics are near-term needs. New knowledge to improve livestock reproduction, particularly in dairy and egg production, remains a high priority. We must also address, through partnership with industry, development of new products with enhanced nutritional values. Research on new solutions will be coupled with delivery through extension at every step.

Youth development topics range from providing enhanced subject matter knowledge beyond that available in schools to providing opportunities for better lifestyle decision-making to creating a culture of leadership among youth. We continue to focus on the creation and

delivery of research-based knowledge on decision-making that will augment after-school programs and dovetail with state educational standards. The importance of our non-formal youth education efforts in contributing to STEM education efforts should not be overlooked. Family and consumer science programs focus on diet, nutrition, and health with efforts in the evaluation of food and health and food safety. Our stakeholders continue to be concerned with balancing the necessities of agricultural production with expectations of newly-rural residents who interpret their quality of life very differently than traditional agriculture-based residents. We will provide tools to municipal officials and other decision-makers to help them balance these competing land use decisions, and we continue to engage in research-informed education on the value of agriculture and minimizing conflicts among citizen constituencies.

Renewable energy resources and the extraction of new sources of non-renewable fuels are of great interest to stakeholders. Our initial work with property owners and resource-associated industries will expand to address other citizen interests, such as potential impacts on water supplies, invasive species and forest fragmentation, property values, and community resilience.

2. How will the planned programs address the needs of under-served and under-represented populations of the State(s)?

Focus on underserved populations has long been a specific goal of our extension and research programs. An assessment of underserved groups will also guide the program planning process. Programs that meet the needs of underserved groups across the state are of continuing importance, and the issue of diversity is one that crosses all planned program issue areas. Our College's Diversity and Civil Rights page can be viewed at <http://diversity.cas.psu.edu/Default.html>.

Cooperative Extension boards and committees strive to have demographic representation of respective county demographics; minorities representing county populations, including Hispanics, African Americans, Asians and other cultural groups such as Anabaptists, serve on these groups.

Examples of specific needs of underserved and underrepresented populations in Pennsylvania include research and extension programming on women in agriculture, cultural differences in the agricultural workplace involving the Hispanic workforce in agriculture, and development and implementation of effective programs to help youth at risk make positive lifestyle decisions. Women are a growing force in the management of agricultural operations and businesses, and traditional approaches for the extension delivery of research based recommendations have not been effective at reaching these audiences. We will invest research and extension funding in a joint program to establish and deliver new programs and evaluate the effectiveness of these programs. The Hispanic workforce in Pennsylvania agriculture is growing, and we will continue to work with joint function and multistate programming to improve cultural understanding that will help managers more effectively interact with their workforce. Several funded programs deal with the development of new educational programs for youth at risk, based on the science of youth development, community involvement, and leadership, and the implementation of these programs in multiple locations around Pennsylvania. These programs are both multistate and joint research/extension efforts.

3. How will the planned programs describe the expected outcomes and impacts?

Each planned program included in this Plan of Work will include expected outcomes and impacts. Progress toward the anticipated outcomes is guided by the logic models and will be reported under the respective planned program. Some specific directions from multistate and joint research/extension programs follow.

Agricultural Systems - The systems approach that underlies our College's strategic plan is a perfect description of agricultural systems. Our focus on reducing inputs into agricultural production relies on new research data and translation of those data to practice in the production regions of Pennsylvania. Our work on the specialty crops that characterize much of Pennsylvania agriculture is an excellent example of several years of AES-supported research in the basic biology of tree fruit and grape pests eventually yielding recommendations to growers that not only produce high quality fruit but also significantly reduce pesticide inputs and costs to growers. Our dairy production requires collaboration among nutritionists, reproductive biologists, agronomists, economists, and marketing specialists, to name a few. We expect reduced input costs, improved efficiencies of operation, and, among some producers, selection of value-added options to increase revenues.

Families, Youth, and Communities - We will continue to develop our 4-H youth program as a manifestation of STEM education through informal delivery systems. The leadership, community responsibility, and team-building skills that accompany the technical education of 4-H programs lead into a focus on family and community. Our focus on rural Pennsylvania to help one half of the state adapt to natural gas extraction from Marcellus Shale deposits began as a stakeholder-driven Cooperative Extension approach, but has now grown to a joint research-extension enterprise as more gaps in our current knowledge of how best to help shape the financial windfall that rural communities are experiencing into sustainable growth in those communities. Family education in diet, nutrition, and health will continue to focus on individual well-being.

Natural Resources and Environment - Linked to the Agricultural Systems program, the reliance of Pennsylvania agriculture on livestock production, especially dairy and poultry, creates huge environmental challenges. The increased focus on the health of the Chesapeake Bay means that new policies will likely be introduced here in Pennsylvania and the watershed first before being applied to other watersheds nationwide. We are balancing the application and demonstration of current best management practices with the need to develop and validate new technologies and to insert the best available science into policy-making.

Pest Management - Reduced inputs without compromising agricultural product quality is closely related to Agricultural Systems and the work that we conduct under that program. We are continuing to refine our predictive models, using the science of the crop and pests to develop tools that can guide decisions in the field. Our goals here are to see increased reference to pest prediction tools, expecting that biologically-based pest management will result in reduced pesticide inputs. We also continue to focus on invasive species in forest and agronomic systems.

Global Food Security & Hunger - This program is, in large measure, a capstone of many of the other planned programs. In the end, global food security drives the food security for us all. Part of the solution is to encourage Pennsylvania producers to be globally competitive in their commodity and value-added production. Another important contribution will be to continue to discover and develop new genetic resources (biotech and conventional) and production practices that can be transferred to food insecure populations. Finally, the transfer of these resources and practices must be accomplished in a sociological framework, so we will engage our social scientists in developing new tools to measure acceptance of new crop varieties and integration into local food systems.

Climate Change - Climate change issues arise in many contexts relative to agricultural production. We are continuing to work across research and extension objectives to establish

science-based methods to evaluate the role of agriculture in greenhouse gas production. There is substantial interest in carbon credits and the like among our Pennsylvania stakeholders, but the implementation of these concepts is still in early stages, and science is needed to underlie the development of tools, the establishment of policy, and the education of the public to implement these practices. We expect to have an impact on Pennsylvania policy development relative to region-specific approaches to mitigate climate change.

Sustainable Energy - The national projections and mandates for renewable fuel feedstocks tend to take a regional perspective. We are likewise focused on identifying the most efficient use of our feedstock acreage given our climate and topography. This will involve research on production efficiencies for new crops, some annual and some perennial, and the translation of that research into recommendations for farmers, foresters, and other land managers (e.g., reclaimed mine lands represent a significant acreage that might be fruitfully employed for this purpose). Another significant barrier to implementation progress in biomass energy systems is in processing and transport of biomass. We will conduct research on densification and efficient supply chain issues to translate to industry for adoption.

Childhood Obesity - Our extension programming in this program area will focus on prevention education to a variety of appropriate audiences. Evidence-based programs will be delivered to schools, camps and communities; an interdisciplinary approach will work to establish healthy populations based upon a combination of diet, exercise, and self image.

Food Safety - Our food safety portfolio extends from the farm to the fork, with work on-farm to assess foodborne pathogen loads and establish Good Agricultural Practices (GAPs), research and extension in processing and distribution to reduce risks to consumers, and extension programs at the consumer level to increase understanding of how they can influence the vast majority of food safety incidents. We will assess our contributions to the science behind GAPs and our ability to deliver these tools to Pennsylvania commodities. Our HACCP and ServSafe® training are other key outcomes that have demonstrated having direct positive impact on consumer food safety.

4. How will the planned programs result in improved program effectiveness and/or

The measures used to determine the impact of joint and multi program activities will demonstrate the effectiveness of planned programs. Much of our research and the delivery are conducted in direct response to needs expressed by stakeholders through cooperative extension. In turn, the delivery of research efforts occurs through cooperative extension programming. Specific examples of this effectiveness are described in the planned programs sections of this Plan of Work.

Corbin, M., Kiernan, N.E., Koble, M.A., Watson, J., and Jackson, D. 2004. "Using the Logic Model to Plan Extension and Outreach Program Development and Scholarship," *Journal of Higher Education Outreach and Engagement*, Vol. 10, No. 1, pp. 61-77.

IV. Stakeholder Input

1. Actions taken to seek stakeholder input that encourages 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

- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of the general public
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public

Brief explanation.

Stakeholder input is actively sought to help set the course for CES and AES programs. Our primary stakeholder input is received through cooperative extension. CE engages in periodic statewide needs assessments, and the results of these assessments are incorporated into our College of Agricultural Sciences Planning and Reporting system. Our State Programs are based on stakeholder input and continued engagement with our stakeholders. Thus, stakeholder input is a key attribute of extension programming. This, in turn, provides input into our research agenda, especially through faculty who are jointly appointed on extension and research funding. In addition, extension personnel in each county confer with their local advisory groups as they determine the local focus of their educational programs. College administration and faculty advisory groups confer regularly with key stakeholder groups. The Penn State Agricultural Council (<http://agcouncil.cas.psu.edu>) provides us with direct contact to over 100 member organizations and groups representing the agricultural industry across Pennsylvania. 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, Cooperative Extension Council, the Pennsylvania Christmas Tree Growers Association, and the Pennsylvania Floral Industry Association. Through direct faculty and extension educator contacts, we have regular contact with the private sector to assess their specific needs. 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, the Pennsylvania Department of Environmental Protection, and the 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 will be 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.

Special attention was paid to assessing the needs of groups who might be considered "underserved" in locations across the state. County, regional, and program advisory

committees continue their role in providing valuable information on extension programming needs; these groups have minority representation where appropriate. 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. Surveys of County Commissioners are conducted periodically to collect information on their constituent's needs.

2(B). A brief statement of the process that will be 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
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public
- Other (Focus Groups)

Brief explanation.

Extension was restructured into 19 Natural Work Groups (NWG) in 2009; programming began on July 1, 2010. Each NWG is responsible for soliciting stakeholder input on key issues for program development. Multiple methods are used by the NWGs, including one-on-one discussions, focus groups, and surveys. In 2009, a survey of the Agricultural Council was conducted to identify their key issues. As the NWGs were forming, a survey of County Commissioners was also conducted.

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.

Stakeholder concerns and opinions are useful in annual budget planning and requests. Emerging issues and refocusing of priorities are part of the dynamics of an adaptive organization. We have greatest success when we combine leadership into new program areas with an acknowledgment of the needs of our stakeholders. The stakeholders defined previously play an important role in helping us set priorities and make transitions in our research and extension agendas. Of particular importance are formal presentations by administrators, faculty, and extension educators to groups such as the Pennsylvania Council of Cooperative Extension Associations, the Penn State Agricultural Council, and county extension advisory groups that highlight our current and planned activities, but, of greater importance, specifically address the close connection between our ongoing research and the extension programming that translates this research into practice. While stakeholders are not directly involved with the hiring process, input into key focus areas is an important component of our staffing plan.

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

2. Brief summary about Planned Program

Our research and extension programs will continue to focus on the farm-to-fork continuum, with emphasis on research-based educational programs for the producers of agricultural commodities. Pennsylvania is a national and world leader in ag production and processing. With agriculture as the largest industry in Pennsylvania, Penn State will continue to provide educational science-based outreach programs that improve the profitability and sustainability of production agriculture. Actions to increase the value of goods and services within the ag sector increase profitability at the local or community level. These efforts take into consideration and address the changing societal awareness and interest in animal welfare. Both agencies at the state and federal level, and the consuming public have a heightened awareness and expectation for environmental issues that can be a factor in plant and animal production. Producers are informed and educated on BMP's that increase the level of profitability and sustainability of ag systems in an environmentally acceptable manner. The health and welfare of production animals is a priority factor for producers. The inter-connectiveness between plants, animals, people, and the environment is increasingly an important issue in decision making. Regulatory expectations are more prominent in decisions relative to agriculture production. Future extension and research programs will function in a more collaborative manner across units. Some commodity specific programs will be replaced by more universal topics common to animal or plant production programs. Themes common to diverse areas of expertise will focus on issues common to unique and similar commodity production enterprises. Cross cutting research and extension programs will look more broadly at the needs of agriculture systems across the continuum of farm-to-fork in Pennsylvania and beyond.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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% | | 9% | |
| 204 | Plant Product Quality and Utility (Preharvest) | 5% | | 5% | |
| 205 | Plant Management Systems | 9% | | 8% | |
| 206 | Basic Plant Biology | 3% | | 8% | |
| 301 | Reproductive Performance of Animals | 9% | | 5% | |
| 302 | Nutrient Utilization in Animals | 7% | | 5% | |
| 303 | Genetic Improvement of Animals | 5% | | 3% | |
| 304 | Animal Genome | 4% | | 4% | |
| 305 | Animal Physiological Processes | 3% | | 7% | |
| 307 | Animal Management Systems | 9% | | 3% | |
| 308 | Improved Animal Products (Before Harvest) | 3% | | 1% | |
| 314 | Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals | 6% | | 2% | |
| 402 | Engineering Systems and Equipment | 3% | | 3% | |
| 501 | New and Improved Food Processing Technologies | 6% | | 6% | |
| 502 | New and Improved Food Products | 3% | | 7% | |
| 601 | Economics of Agricultural Production and Farm Management | 3% | | 6% | |
| 602 | Business Management, Finance, and Taxation | 6% | | 5% | |
| 603 | Market Economics | 3% | | 3% | |
| 604 | Marketing and Distribution Practices | 2% | | 7% | |
| 610 | Domestic Policy Analysis | 2% | | 3% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Pennsylvania agriculture generates nearly six billion dollars in farm gate sales. Over sixty thousand Pennsylvania farms contribute to the national food supply. An increasingly larger segment of the

agriculture production sector is new farmers. This group is younger, with smaller farms, greater off-farm income, and smaller per-farm income than the average. This group of "new farmers" will need access to science-based answers to the agriculture production questions that are available through extension. New and emerging issues will provide challenges to all agricultural producers. The college strategic plan identifies entrepreneurship as one of 5 strategic initiatives. Within that initiative is a commitment to continue to expand and build on current programs such as PA Food Ventures and other programs that provide entrepreneurial skill development for Pennsylvania's farm and food sectors. Another strategic initiative for the college is pest prediction and response. Within that area, research and outreach programs for prediction and response to pests, pathogens and infectious diseases remains a priority. Additionally, the college will continue to pursue proactive and cost-effective approaches to anticipate, isolate and eradicate outbreaks, including potential bioterrorist threats affecting crop, livestock, and forest production, as well as exploring and developing alternative production practices, and programs for the prevention and growth control of invasive species to limit economic damage.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Research and extension programs will continue to focus on the need to provide information to producers to make informed decisions. The focus of programming is moving from an increase production simplified solution, to a more holistic approach that matches resources, skills, alternatives and implications to strengthen the economic, social, environmental, political stability of the ag sector. Increasing consumer expectations for production and processing protocol, including animal welfare, quality assurance, marketability, environmentally favorability and other factors will add new dimensions for the expectations of producing, processing, distributing and the ultimate consumption of food produced on PA farms. Carbon imprint and increased interest in local food systems and community-based agriculture will continue to gain interest and demand the associated research to provide solutions for producers. The global economy, including global production factors and increasing world populations will have an increasing affect on local production. Agrosecurity management practices to address natural (pest, diseases and weather adversity) and intentional (accidental and intentional contamination and disruption issues) will require vigilance, preparedness and mitigation to reduce, eliminate, manage and control potential negative production factors. Increasing environmental expectations for production agriculture will need to be addressed with science-based solutions to the increasing demand for better environmental stewardship. Collectively and individually, these current and future issues will require a continued strong presence for Penn State Research and Extension with the ag sector for Pennsylvania and the world.

2. Ultimate goal(s) of this Program

Multi-disciplinary teams of Extension educators will provide information to the Food and Agriculture sector to enable them to make informed decisions. Educational programs will provide options for the ag sector to learn about, understand, gain skill, and implement Best Management Practices to maintain and enhance the sustainability of PA agriculture production. PA agriculture producers will produce high quality food products in an economically and environmentally advantageous manner. Pennsylvania producers will gain an increase in international market share for food. Production practices will result in increased profitability, increased yields, reduced costs, and improved environmental impact. Allied industry to production agriculture will enhance the economic impact for local communities and the state. Penn State Extension will provide leadership for regional and national Extension programs.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

| Year | Extension | | Research | |
|------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| 2012 | 103.0 | 0.0 | 93.0 | 0.0 |
| 2013 | 103.0 | 0.0 | 93.0 | 0.0 |
| 2014 | 103.0 | 0.0 | 93.0 | 0.0 |
| 2015 | 103.0 | 0.0 | 93.0 | 0.0 |
| 2016 | 103.0 | 0.0 | 93.0 | 0.0 |

V(F). Planned Program (Activity)

1. Activity for the Program

AES research will generate new data on elements of agricultural production in Pennsylvania and, increasingly, work to connect these research questions in a systems fashion. In addition to technical solutions, we will conduct research into the financial impacts of alternatives for farm operations of different scope. Extension Program teams will develop educational material that translates research into information applicable to solve current and emerging issues for Agriculture Systems in PA. Stakeholder groups will create partnerships with Extension to extend resources and provide support and advocacy for the needs of agriculture systems. Multi-disciplinary educational intervention will address complex production, marketing, environmental, economic and societal issues that influence production agriculture. Programs will strive to maintain the level of agriculture production, and thus, the economic drivers for individuals, communities, commodity groups, consumers, and the state and nation.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

| Direct Methods | Indirect Methods |
|----------------|------------------|
|----------------|------------------|

| | |
|--|--|
| <ul style="list-style-type: none"> ● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations | <ul style="list-style-type: none"> ● Billboards ● Newsletters ● Web sites ● Other 1 (Web Delivery) |
|--|--|

3. Description of targeted audience

Youth enrolled in Animal Science and Crop projects, volunteer leaders, parents, commodity groups, farm managers, farm workers, and farm owners, farm consultants, agribusiness, ag professionals, agency representatives, and decision and policy makers.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

| | Direct Contact Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|------|-----------------------|--------------------------|-----------------------|-------------------------|
| Year | Target | Target | Target | Target |
| 2012 | 103000 | 2000000 | 3000 | 14000 |
| 2013 | 103000 | 2000000 | 3000 | 14000 |
| 2014 | 103000 | 2000000 | 3000 | 14000 |
| 2015 | 103000 | 2000000 | 3000 | 14000 |
| 2016 | 103000 | 2000000 | 3000 | 14000 |

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

2012:4 2013:2 2014:4 2015:2 2016:4

3. Expected Peer Review Publications

| Year | Research Target | Extension Target | Total |
|------|-----------------|------------------|-------|
| 2012 | 0 | 0 | 500 |
| 2013 | 0 | 0 | 500 |
| 2014 | 0 | 0 | 500 |
| 2015 | 0 | 0 | 500 |
| 2016 | 0 | 0 | 500 |

V(H). State Defined Outputs

1. Output Target

- Number of invention disclosures submitted.

| | | | | |
|---------------|---------------|---------------|---------------|---------------|
| 2012:2 | 2013:2 | 2014:2 | 2015:2 | 2016:2 |
|---------------|---------------|---------------|---------------|---------------|

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

| | | | | |
|--------------------|--------------------|--------------------|--------------------|--------------------|
| 2012:117000 | 2013:117000 | 2014:117000 | 2015:117000 | 2016:117000 |
|--------------------|--------------------|--------------------|--------------------|--------------------|

V(I). State Defined Outcome

| 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 Target

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

2. Outcome Type : Change in Knowledge Outcome Measure

2012:20000 2013:20000 2014:20000 2015:20000 2016:20000

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

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

2. Outcome Type : Change in Action Outcome Measure

2012:3000

2013:3000

2014:3000

2015:3000

2016:3000

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Number of volunteers that helped with program leadership or delivery.

2. Outcome Type : Change in Action Outcome Measure

2012:300

2013:300

2014:300

2015:300

2016:300

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations

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

Description

There is probably no industry more affected by adverse factors more than production agriculture. Weather extremes and anomalies dramatically affect plant health and productivity. Adverse weather can also affect productivity for animal agriculture. Not only are effects of adverse weather recognized directly by Pennsylvania producers on their crops and herds, but weather affecting crop and animal production in distant parts of the world affect market prices for products and commodities produced and/or utilized by Pennsylvania agriculture producers. Market fluctuations are affected not only by weather events, but also political factors, consumer demand, societal influence on environmental and production methods. Governmental and other political regulations locally, nationally and internationally affect market share for Pennsylvania producers. Understanding the global influence for markets of commodities produced and utilized by Pennsylvania producers can help reduce risk, and ultimately improve profitability for producers. Financial support from local, state, and national public sources are under increasing scrutiny. Support levels are stagnant, reducing, or in rare occasions, increasing slightly. As a result, research and outreach programming is reviewed to adjust and balance programming with available support as necessary. Current trends indicate lower funding and increasing costs which can only be accommodated by fewer programs and fewer people.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Other (Direct Observation)

Description

Evaluation and impact results will be gathered using a variety of measurement tools including producer surveys, focus groups, case studies, and observations. Of particular interest will be the measurable impact from adoption of best practices. Knowledge, attitude, skills, and aspirations will all be assessed from a variety of educational program participants. External assessments which are measured quantitatively will be collected and evaluated pre- and post-program delivery. Included will be a variety of environmental factors such as air, water, and soil quality. Quality assurance and food safety measurements will be assessed for improvements in the safety of the agricultural products that are produced.

2. Data Collection Methods

- Sampling
- Whole population
- Mail
- Telephone

- On-Site
- Structured
- Case Study
- Observation
- Other (Focus Groups)

Description

Evaluation and impact assessment will be done directly with participants of Extension educational programs. Emphasis will be given to impact as the result of implementation of management practices learned from Extension programs. Knowledge and attitude assessment improvement will be measured, but adoption and the impact realized as the result of adoption of practices will receive greater priority in evaluation and impact assessment. Methods will include sampling, surveys, case studies with detailed production and economic data, and a variety of tests to assess pre- and post-adoption.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Families, Youth, and Communities

2. Brief summary about Planned Program

Strong communities are built upon the foundation of resilient individuals and families. These foundations, however, are being stressed by globalization of our economy resulting in a displaced work force and the changing demographics of our citizens. Penn State demonstrates commitment to the citizens of the Commonwealth through a diverse array of research and extension programs that address long-standing and emerging issues. Nutrition, personal economics, and lifestyle choices continue to be important targets for Penn State programs. Youth development, primarily through 4-H, is another educational mechanism that remains relevant as we adapt our educational message to reach the next generation of young people. Our efforts extend beyond the traditional 4-H club structure to influence in-school lessons that address state educational standards and to offer program ideas to non-4-H after school programs and youth sports. We continue to develop programs -- validated by research -- that impart civic responsibility, interpersonal relationships, and leadership lessons to youth. These latter lessons do not end with our youth populations. Many of our research efforts in this planned program address civic engagement and effective community institutions to provide residents and businesses with a healthy environment in which to exist. This research is delivered via extension programming in a variety of forms including work with local governments and non-governmental organizations, advice to businesses new and old, and facilitation of community strategic planning and visioning. Experiences gained during our first 150 years now must be adapted to apply to a changed and continually changing environment. In the early days of our research and extension programs, we focused primarily on a rural audience, and Pennsylvania, although still rural in nature, now is a much more tightly woven patchwork of communities. Many regions that are key agricultural production zones are also now preferred residential locales. This mix creates a variety of tensions that can be resolved only through creative translation of the latest social science and agricultural research into programs that help to provide solutions for previously unknown problems. A current example of rural-urban interface tensions is the definition of "customary agricultural practices." Such definitions were unnecessary in the recent past, but now are key for crafting sensible solutions to conflicting pressures on land use. Our contributions to these and other community-based conflicts are central for ensuring a high quality of life for Pennsylvania residents.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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% | | 3% | |
| 503 | Quality Maintenance in Storing and Marketing Food Products | 1% | | 5% | |
| 504 | Home and Commercial Food Service | 5% | | 1% | |
| 512 | Quality Maintenance in Storing and Marketing Non-Food Products | 1% | | 0% | |
| 607 | Consumer Economics | 3% | | 8% | |
| 608 | Community Resource Planning and Development | 10% | | 20% | |
| 701 | Nutrient Composition of Food | 2% | | 1% | |
| 702 | Requirements and Function of Nutrients and Other Food Components | 4% | | 4% | |
| 704 | Nutrition and Hunger in the Population | 10% | | 0% | |
| 721 | Insects and Other Pests Affecting Humans | 6% | | 5% | |
| 723 | Hazards to Human Health and Safety | 5% | | 15% | |
| 801 | Individual and Family Resource Management | 3% | | 1% | |
| 803 | Sociological and Technological Change Affecting Individuals, Families, and Communities | 1% | | 16% | |
| 804 | Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures | 0% | | 1% | |
| 805 | Community Institutions, Health, and Social Services | 0% | | 9% | |
| 806 | Youth Development | 47% | | 5% | |
| 903 | Communication, Education, and Information Delivery | 1% | | 6% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Situation and Scope)**1. Situation and priorities**

Pennsylvania is a state in transition. Our rural nature is changing with the redistribution of populations, and the diversity of the Commonwealth's population is shifting. These changes require a shift from some of our traditional research and extension focal areas to areas that permit us to address emerging issues. As the human landscape changes within the state, our civic structure struggles to cope with this change. State and local governments need research and advice on how to adapt regulations and policies (e.g., zoning, taxes) to situations different from those in place when the regulations were adopted.

Changes in communities lead to other stresses. Communities that were relatively isolated and closed have opened, both physically through population shifts and virtually through information technology. A focus on rural issues is no longer sufficient or desirable -- we must adapt to the needs of stakeholders that are new to us by addressing situations that are also new to us, such as grandparents raising grandchildren because the parents are incarcerated for drug abuse. The need for research-based programs that have a positive influence on community vitality is greater than it has ever been. Changes in communities mirror changes in family dynamics. Our work on healthy families, both by addressing the family unit itself and contributions to individual health and well-being, remains timely. In many parts of the state, our extension programming, underpinned by research, represents one of the major influences on nutrition, overall health, and economic decisions. We influence the next generation through our 4-H and youth programming, but we also provide guidance on a multigenerational scale. With increasing focus on the health benefits of foods, we have an opportunity to expand our long-standing work in nutrition advice to consumers. Many Pennsylvania residents are reliant upon multiple income sources to support their families, and we work in this arena to provide programs that help families achieve financial stability. We have more and more opportunities to work with local social service organizations, both as partners in program delivery and as a source of research-based ideas for new approaches to family and community problems.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Funding will remain constant or increase in support of this planned program. The nature of Pennsylvania communities will continue to shift, creating more rural-urban interfaces with the problems and opportunities that they bring. New tensions in these changing communities will demand a population interested in positive civic engagement, and this population will require a deep understanding of issues relevant to both rural and non-rural citizens. Individual need for education on health, nutrition, and economic topics will continue to exist.

2. Ultimate goal(s) of this Program

The ultimate goals of the Family, Youth, and Community research and extension programs are to help communities remain economically and socially healthy, so that residents of the communities can also experience safe and healthy lives. These goals will be achieved through our extension programs in adult development and aging, child care, family and youth resiliency, parenting skills, financial and resource management, diversity education, 4-H/youth development, character and civic education, health education, leadership and volunteerism, nutrition and food safety, workforce development, community capacity building and decision making, place-based economic development, and community-based agricultural development and supporting research programs. Ultimately, we are addressing concerns articulated in a recent Brooking Institution report that Pennsylvania is facing declining inter-city infrastructure, expanding urban areas that outpace our population growth rate, declining job opportunities, and a youth migration out of the state. Our goal is to help reverse these trends.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

| Year | Extension | | Research | |
|------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| 2012 | 167.0 | 0.0 | 32.0 | 0.0 |
| 2013 | 167.0 | 0.0 | 32.0 | 0.0 |
| 2014 | 167.0 | 0.0 | 32.0 | 0.0 |
| 2015 | 167.0 | 0.0 | 32.0 | 0.0 |
| 2016 | 167.0 | 0.0 | 32.0 | 0.0 |

V(F). Planned Program (Activity)

1. Activity for the Program

conduct research on civic engagement; conduct educational workshops and meetings on strengthening families, youth, and communities; conduct educational workshops and meetings on improved nutrition and health; develop and implement science-based 4H and school curricula; conduct research on effective educational programs for youth-at-risk

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

| Direct Methods | Indirect Methods |
|--|--|
| <ul style="list-style-type: none"> ● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations | <ul style="list-style-type: none"> ● Public Service Announcement ● Newsletters ● TV Media Programs ● Web sites |

3. Description of targeted audience

extension educators, school teachers, youth, general public, agencies and organizations, families

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

| | Direct Contact Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|------|-----------------------|--------------------------|-----------------------|-------------------------|
| Year | Target | Target | Target | Target |

| | Direct Contact Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|-------------|------------------------------|---------------------------------|------------------------------|--------------------------------|
| Year | Target | Target | Target | Target |
| 2012 | 240000 | 2000000 | 280000 | 110000 |
| 2013 | 240000 | 2000000 | 280000 | 110000 |
| 2014 | 240000 | 2000000 | 280000 | 110000 |
| 2015 | 240000 | 2000000 | 280000 | 110000 |
| 2016 | 240000 | 2000000 | 280000 | 110000 |

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

2012:0 2013:1 2014:0 2015:1 2016:0

3. Expected Peer Review Publications

| Year | Research Target | Extension Target | Total |
|-------------|------------------------|-------------------------|--------------|
| 2012 | 0 | 0 | 200 |
| 2013 | 0 | 0 | 200 |
| 2014 | 0 | 0 | 200 |
| 2015 | 0 | 0 | 200 |
| 2016 | 0 | 0 | 200 |

V(H). State Defined Outputs

1. Output Target

- Number of invention disclosures submitted.

2012:0 2013:1 2014:0 2015:1 2016:0

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

2012:240000 2013:240000 2014:240000 2015:240000 2016:240000

V(I). State Defined Outcome

| 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 Target

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

2. Outcome Type : Change in Knowledge Outcome Measure

2012:34000 2013:34000 2014:34000 2015:34000 2016:34000

3. Associated Knowledge Area(s)

- 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
- 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
- 805 - Community Institutions, Health, and Social Services
- 806 - Youth Development
- 903 - Communication, Education, and Information Delivery

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

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

2. Outcome Type : Change in Action Outcome Measure

2012:8700 2013:8700 2014:8700 2015:8700 2016:8700

3. Associated Knowledge Area(s)

- 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
- 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
- 805 - Community Institutions, Health, and Social Services
- 806 - Youth Development
- 903 - Communication, Education, and Information Delivery

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Number of volunteers that helped with program leadership or delivery.

2. Outcome Type : Change in Action Outcome Measure

2012:7000 2013:7000 2014:7000 2015:7000 2016:7000

3. Associated Knowledge Area(s)

- 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
- 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
- 805 - Community Institutions, Health, and Social Services
- 806 - Youth Development
- 903 - Communication, Education, and Information Delivery

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Extramural Funding)

Description

A variety of factors influence potential outcomes in Families, Youth, and Communities. This is an area where public policy and regulations can influence the research needs and the delivery of research results to stakeholders through Cooperative Extension. Population changes are of particular importance in both priority setting for research and extension and for availability of funding to conduct that work. Appropriations could have impact (positive or negative) on recruiting and retention of AES and CES personnel.

It is our hope that key programs will continue to grow in future years, but the challenge of reduced federal funding for agricultural research and extension dictate that we anticipate maintaining current levels of output.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Other (Direct Observation and Contact)

Description

The evaluation of programs will follow the KASI method of measuring changes in knowledge, attitude, skills and impact, along with changes in behavior as outlined in the Logic Model. Specific methods will depend on the type of changes and impact measures needed. Evaluation instruments will be selected from alternatives available at <http://www.extension.psu.edu/evaluation/Questions.html>

2. Data Collection Methods

- Sampling
- Whole population
- Mail
- Telephone
- On-Site
- Structured
- Case Study
- Observation
- Tests
- Other (Focus Groups)

Description

Data collection methods will depend on the needs of the issue team. Issue teams are charged with the development of evaluation methods. Again, the appropriate evaluation method will be identified and implemented using selections from the <http://www.extension.psu.edu/evaluation/Questions.html>.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Natural Resources and Environment

2. Brief summary about Planned Program

The protection, enhancement, restoration and sustenance of environmental resources is a priority of Penn State's AES and CES in its research, engagement, outreach, and service functions. Environmental quality is influenced by a broad spectrum of activities on the landscape including agricultural practices and production, forest resource management, wildlife and fisheries management, land use decisions, population growth and shifts, recreation, and a variety of others. The planned program integrates and consolidates key activities of AES and CES that, in aggregate, collectively influence the management of natural resources and consequent environment outcomes. In the agricultural sector, producers manage soil resources, balance nutrients, and protect air and water quality while maintaining production efficiencies as environmental regulations are being more stringently enforced. Pennsylvania has significant forest resources, 70% of which is under private ownership, the balance under the management of state, federal, and private sector control. The economics of land use, balancing timber production with recreation, wildlife management, and the economics of land use, balancing timber production with recreation, wildlife management, and environmental degradation, and land development pressure are critical issues facing forest landowners in the state. Local and state governments are attempting to develop and implement policies based upon sound science for the effective management of natural resources and protection of the environment. An array of non-governmental organizations has similar interests in this arena. Each of these stakeholder groups seek input from Penn State that can scientifically support necessary decisions; our combination of research and extension provides this information and, through a feedback process, identifies unmet research and information needs. Key demands for research and extension programming encompass nutrient management, including the economic trade-offs and considerations at the farm, watershed, and regional scales; odor and gaseous emissions from livestock operations, tillage practices in sequence with innovations in manure application, regional waste-to-energy technologies, and effects on water quality, forest management for timber production, recreation, and wildlife management, economics of natural resource management practices, and land use decision-making.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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% | | 7% | |
| 102 | Soil, Plant, Water, Nutrient Relationships | 15% | | 18% | |
| 104 | Protect Soil from Harmful Effects of Natural Elements | 8% | | 1% | |
| 112 | Watershed Protection and Management | 10% | | 17% | |
| 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% | | 17% | |
| 124 | Urban Forestry | 10% | | 3% | |
| 135 | Aquatic and Terrestrial Wildlife | 3% | | 10% | |
| 136 | Conservation of Biological Diversity | 4% | | 9% | |
| 141 | Air Resource Protection and Management | 5% | | 2% | |
| 403 | Waste Disposal, Recycling, and Reuse | 5% | | 6% | |
| 511 | New and Improved Non-Food Products and Processes | 2% | | 8% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Pennsylvania exhibits a significant wealth of natural resources, but also sits at a crossroads with regard to environmental issues surrounding both the management of those natural resources and the maintenance of a vibrant agricultural economy. The questions being posed to our research and extension professionals are both production issues and policy issues. This planned program provides clear opportunities for research and outreach that will have impact. Nutrient management is a perfect example of the nature of the problems that Pennsylvania faces. Livestock agriculture is the major contributor to agricultural income in the state. However, the nutrient load produced by livestock is concentrated in areas that are prone to development for new housing and associated activities, and the production areas threaten important watersheds. Continued viability of livestock agriculture relies on solutions that balance production efficiencies, neighbor perceptions (odor is a major driver in this regard), and environmental quality. Research by AES scientists is addressing animal nutrition to minimize nutrient feed-through, odor mitigation, and alternative waste handling (including generation of value-added energy). This research is translated to programs that can be implemented by producers, and science-based information is shared with stakeholders, including non-governmental agencies and policy-makers in government, to help guide decisions. A second complex system that requires our input is in the management of forest resources. The balance of forest harvest practices, forest regeneration, air-borne pollution, and deer populations is

ultimately responsible for successful forest management. Each of these variables is complex in itself, but a need continues to exist not only for research on the individual variables, but also for system-level research and outreach on the intersection of these variables. Furthermore, the value of the forest being managed is a function of the wood products generated. This industry has been under significant pressure from foreign competition, and new products are needed to revitalize the industry and create new value from our forests. Necessary research encompasses topics like materials research, nanotechnology, bio-based product and bio-derived energy options, and manufacturing techniques to maximize use of the raw material. Water quality and quantity is likely to be a critical agricultural and societal issue in the future; in Pennsylvania, we face issues from quality of private well supplies to the condition of the Chesapeake Bay. The economics of alternative natural resource and environmental decisions must be examined and optimized. This planned program comprises a set of goals that are very similar to the perspective employed in the agricultural systems planned program -- each individual topic can be taken back to the stakeholders only in the context of the remaining topics.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Funding will remain constant or increase in support of this planned program. Local governments will require assistance in addressing competing land use and economic issues involving natural resources and the environment. Reliance on biosources for materials now derived from petroleum will continue to increase. Public interest in managing natural resources will continue to present competing, and sometimes conflicting, demands. Interest in environmental quality will continue to drive a need for better stewardship.

2. Ultimate goal(s) of this Program

Define new value-added, bio-derived products from sources such as wood and manure, and provide economic analyses of the generation of these products as potential business opportunities in Pennsylvania. Identify and evaluate ecosystem services provided by working lands as part of the suite of products and services provided by agriculture and forests. Improve urban environments through green infrastructure research and Extension. Develop and implement new odor and nutrient management methods to facilitate the balance between agriculture and the environment, enabling productive and integrated animal agriculture that protects and sustains environmental quality - air, water and land. Develop and disseminate forest management solutions that address biotic and abiotic effects on forest regrowth. Provide policy makers with science-based recommendations for regulations and best practices in environmental stewardship.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

| Year | Extension | | Research | |
|------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| 2012 | 28.0 | 0.0 | 30.0 | 0.0 |
| 2013 | 28.0 | 0.0 | 30.0 | 0.0 |
| 2014 | 28.0 | 0.0 | 30.0 | 0.0 |
| 2015 | 28.0 | 0.0 | 30.0 | 0.0 |
| 2016 | 28.0 | 0.0 | 30.0 | 0.0 |

V(F). Planned Program (Activity)

1. Activity for the Program

Activities will include: The Pennsylvania Discovery Watersheds Initiative to address nonpoint source pollution stemming from residential, agricultural, forested, commercial, and municipal sectors. Community-based tools will be developed to a) reduce pollutant loads, b) improve local water quality, and c) remove stream impairments. The program will extend lessons learned from targeted watershed pilots (USDA Showcase watershed, Conewago Creek); and utilize e-newsletters; webinar trainings including webinars to showcase research, BMPs, and innovations in policy, monitoring, and other components of successful watershed programs. The Pond and Lake Management Program will focus on improving management of water bodies that are important agricultural and recreational resources but also represent both sources and sinks for water pollutants; program seeks to educate pond and lake owners about the proper construction, management, and state regulations. The Safe Drinking Water program will educate private water system owners about the proper location, construction, and management of their drinking water supply. General water supply management programs will focus on emerging contamination issues such as Marcellus gas drilling and pharmaceuticals in water, and the management of on-lot septic systems. The program utilizes trained volunteers and educators to present drinking water clinics, webinars, an online home study course, a portable classroom, and one-on-one interaction. Community and Urban Forestry programs will educate the public on consumptive land development patterns and how they impact sustainable natural resources and their provision of ecosystem benefits. The Sustaining Pennsylvania's Forests program will focus on how to maintain the health and sustainability of woodlots to provide for future forest health and productivity that includes well-planned and executed timber harvests, define new value-added, bio-derived products from sources such as wood and manure, and provide economic analyses of the generation of these products as potential business opportunities in Pennsylvania. Identify and evaluate ecosystem services provided by working lands as part of the suite of products and services provided by agriculture and forests. Urban program foci through green infrastructure research and Extension. Develop and implement new odor and nutrient management methods to facilitate the balance between agriculture and the environment, enabling productive and integrated animal agriculture that protects and sustains environmental quality - air, water and land. Develop and disseminate forest management solutions that address biotic and abiotic effects on forest regrowth. Provide policy makers with science-based recommendations for regulations and best practices in environmental stewardship.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

| Direct Methods | Indirect Methods |
|---|---|
| <ul style="list-style-type: none"> ● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations ● Other 1 (e-classroom) | <ul style="list-style-type: none"> ● Public Service Announcement ● Newsletters ● TV Media Programs ● Web sites ● Other 1 (Webinars) ● Other 2 (Blogs) |

3. Description of targeted audience

Agricultural producers; natural resources managers; policy makers; extension educators; non-governmental organizations; local, state, and federal agencies; private forest landowners; wood products producers, municipalities and planners, other decision makers

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

| | Direct Contact Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|-------------|------------------------------|---------------------------------|------------------------------|--------------------------------|
| Year | Target | Target | Target | Target |
| 2012 | 20000 | 560000 | 5750 | 200 |
| 2013 | 20000 | 560000 | 5750 | 200 |
| 2014 | 20000 | 560000 | 5750 | 200 |
| 2015 | 20000 | 560000 | 5750 | 200 |
| 2016 | 20000 | 560000 | 5750 | 200 |

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

2012:2 2013:1 2014:2 2015:1 2016:2

3. Expected Peer Review Publications

| Year | Research Target | Extension Target | Total |
|-------------|------------------------|-------------------------|--------------|
| 2012 | 0 | 0 | 250 |
| 2013 | 0 | 0 | 250 |

| Year | Research Target | Extension Target | Total |
|------|-----------------|------------------|-------|
| 2014 | 0 | 0 | 250 |
| 2015 | 0 | 0 | 250 |
| 2016 | 0 | 0 | 250 |

V(H). State Defined Outputs

1. Output Target

- Number of invention disclosures submitted.

2012:1 2013:1 2014:1 2015:1 2016:1

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

2012:30000 2013:30000 2014:30000 2015:30000 2016:30000

V(I). State Defined Outcome

| 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 Target

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

2. Outcome Type : Change in Knowledge Outcome Measure

2012:6700 2013:6700 2014:6700 2015:6700 2016:6700

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

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

2. Outcome Type : Change in Action Outcome Measure

2012:3750 2013:3750 2014:3750 2015:3750 2016:3750

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Number of volunteers that helped with program leadership or delivery.

2. Outcome Type : Change in Action Outcome Measure

2012:800 2013:800 2014:800 2015:800 2016:800

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect 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)

Description

A variety of factors influence potential outcomes in Natural Resources and Environment. This is an area where public policy and regulations can influence the research needs and the delivery of research results to stakeholders through Cooperative Extension. Focus on renewable energy has a profound impact on identification of priorities and action on those priorities. Unexpected natural climate variation continues to influence priority identification. Changing demographics and land use decisions are key drivers for natural resource management. Appropriations could have impact (positive or negative) on recruiting and retention of AES and CES personnel. It is our hope that key programs will continue to grow in future years, but the challenge of reduced federal funding for agricultural research and extension dictate that we anticipate maintaining current levels of output.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Other (Direct Observation)

Description

The evaluation of programs will follow the KASI method of measuring changes in knowledge,

attitude, skills and impact, along with changes in behavior as outlined in the Logic Model. Specific methods will depend on the type of changes and impact measures needed. Evaluation instruments will be selected from alternatives available at <http://www.extension.psu.edu/evaluation/Questions.html>.

2. Data Collection Methods

- Sampling
- Whole population
- Mail
- Telephone
- On-Site
- Structured
- Case Study
- Observation
- Other (Focus Groups)

Description

Data collection methods will depend on the needs of the issue team. Issue teams are charged with the development of evaluation methods. Again, the appropriate evaluation method will be identified and implemented using selections from the <http://www.extension.psu.edu/evaluation/Questions.html>.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Pest Management

2. Brief summary about Planned Program

Effective pest management strategies have been at the heart of Penn State excellence for many years. As new pests emerge, as our crop portfolio shifts, and as environmental knowledge and rules change, we are faced with the continued need to devise new strategies that acknowledge these changes and take advantage of emerging technologies. Production of high quality, pest-free agricultural products while minimizing the use of pesticides is a continuing challenge. Penn State focuses on integrated pest management, attempting to treat pest management from a systems approach. Stakeholders in this planned program are primarily agricultural producers and agricultural support industries. An increasingly important group of stakeholders is the general public, both as consumers of agricultural products (e.g., interest in healthy products produced with minimal pesticides) and through pest management decisions in school, business, and residential environments. Our work, both the research base and the related extension programs, also inform government agency policies and programs. This planned program is closely related to activities in all of our other planned programs, but the agricultural and food biosecurity and agricultural systems programs are especially connected. The development of monitoring and predictive tools to assess pest presence and spread, the accurate diagnosis of pest species, and the integration of pest control into other management decisions are all key areas that are synergized by other planned programs in our AES and extension portfolios. Many of our pest management activities are organized around regional or statewide multidisciplinary, multifunctional teams (as appropriate for specific commodities). This is also a planned program that works in a multistate environment, as many of the pest/crop combinations are regional or national in scope. Key focus areas for research include alternative biologically-based pest control strategies, development of monitoring tools to better identify and track movement of pests, geospatially-referenced predictive models for anticipating management needs, and area-wide approaches to replace local management decisions. These research efforts will support producers interested in organic and sustainable agricultural production, a growing segment of our farm population. All of this research can be translated into practice almost immediately through our extension programming, and data gaps are revealed by interactions with producers in real time.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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% | | 23% | |
| 212 | Pathogens and Nematodes Affecting Plants | 13% | | 21% | |
| 213 | Weeds Affecting Plants | 7% | | 7% | |
| 214 | Vertebrates, Mollusks, and Other Pests Affecting Plants | 7% | | 0% | |
| 215 | Biological Control of Pests Affecting Plants | 12% | | 7% | |
| 216 | Integrated Pest Management Systems | 28% | | 20% | |
| 311 | Animal Diseases | 8% | | 16% | |
| 404 | Instrumentation and Control Systems | 2% | | 2% | |
| 901 | Program and Project Design, and Statistics | 8% | | 2% | |
| 902 | Administration of Projects and Programs | 7% | | 2% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Crop production in Pennsylvania is extremely diverse, creating challenges for research and extension to provide effective pest management advice. New pests appear regularly, and existing pests evolve resistance to current management practices. Pressure to develop integrated and biologically-based pest management strategies is driven by these facts and the wishes of our stakeholders to have blemish-free produce with a minimum of pesticide exposure. Much of our ability to recommend alternative control measures and reduced pesticide applications derives from prompt, accurate recognition of pests (diagnosis and scouting) and a good understanding of geographic and temporal distributions of the pests (population dynamics). Thus, Pennsylvania AES scientists need to work with extension professionals and stakeholders to build a better knowledge of the biology of key pests. Research knowledge needs to be translated into decision support tools and new control measures. Our past work in integrated pest management provides an important baseline for these efforts, but the changing face of agricultural production and concomitant changes in pest profiles mean that new challenges await us. Success in this planned program will be closely tied to managing Pennsylvania agriculture as a system, and many of the approaches needed to manage routine pest pressure in crops are identical to the tools that will address agricultural and food biosecurity. New stakeholders in the urbanizing environment are interested in the same outcomes (new reduced-pesticide strategies) for the home, school, and workplace, and we will continue to reach out to them as new customers for our science-based recommendations.

2. Scope of the Program

- In-State Extension

- In-State Research
- Multistate Research
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Funding will remain constant or increase in support of this planned program. The suite of pests for which new management strategies are needed will continue to expand as pest introductions occur, as new crops are added by Pennsylvania producers, and as resistance and regulations reduce the breadth of available pest control alternatives. An integrated approach that considers the biology of the pest and the environment in which the pest must be managed (e.g., farm vs. forest vs. dwelling) will be the most rational choice of pest management strategies. Producers seeking low-input pest management strategies will become a larger segment of our clientele.

2. Ultimate goal(s) of this Program

Develop a geospatially referenced predictive modeling capacity that can be adapted to accommodate the particular biological characteristics of multiple pests, and refine these general models to provide decision support to agricultural producers and other pest management professionals. Develop molecular and classical diagnostic tools for pests to Pennsylvania agriculture, and more effectively link this diagnostic capacity with local audiences through extension professionals. Deliver this research base to end users through multifunctional, multidisciplinary teams that operate with a systems approach to pest management.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

| Year | Extension | | Research | |
|------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| 2012 | 35.0 | 0.0 | 69.0 | 0.0 |
| 2013 | 35.0 | 0.0 | 69.0 | 0.0 |
| 2014 | 35.0 | 0.0 | 69.0 | 0.0 |
| 2015 | 35.0 | 0.0 | 69.0 | 0.0 |
| 2016 | 35.0 | 0.0 | 69.0 | 0.0 |

V(F). Planned Program (Activity)

1. Activity for the Program

conduct research experiments on diagnostic tools for plant pathogens; conduct research experiments on predictive models; conduct research experiments on plant pests; conduct educational workshops and meetings on pest management; develop curricula and resources for effective pest management; partner

with state agencies on integrated pest management

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

| Direct Methods | Indirect Methods |
|--|--|
| <ul style="list-style-type: none"> ● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations | <ul style="list-style-type: none"> ● Public Service Announcement ● Newsletters ● TV Media Programs ● Web sites |

3. Description of targeted audience

agricultural producers, policy makers, state agencies, extension educators, crop consultants, teachers

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

| | Direct Contact Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|-------------|------------------------------|---------------------------------|------------------------------|--------------------------------|
| Year | Target | Target | Target | Target |
| 2012 | 240000 | 140000 | 15000 | 175 |
| 2013 | 240000 | 140000 | 15000 | 175 |
| 2014 | 240000 | 140000 | 15000 | 175 |
| 2015 | 240000 | 140000 | 15000 | 175 |
| 2016 | 240000 | 140000 | 15000 | 175 |

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

2012:3 2013:2 2014:3 2015:3 2016:2

3. Expected Peer Review Publications

| Year | Research Target | Extension Target | Total |
|-------------|------------------------|-------------------------|--------------|
| 2012 | 0 | 0 | 400 |
| 2013 | 0 | 0 | 400 |
| 2014 | 0 | 0 | 400 |

| Year | Research Target | Extension Target | Total |
|------|-----------------|------------------|-------|
| 2015 | 0 | 0 | 400 |
| 2016 | 0 | 0 | 400 |

V(H). State Defined Outputs

1. Output Target

- Number of invention disclosures submitted.

2012:1 2013:2 2014:1 2015:2 2016:1

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

2012:49000 2013:49000 2014:49000 2015:49000 2016:49000

V(I). State Defined Outcome

| 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. |

Outcome # 1

1. Outcome Target

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

2. Outcome Type : Change in Action Outcome Measure

2012:1100 2013:1100 2014:1100 2015:1100 2016:1100

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

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

2. Outcome Type : Change in Action Outcome Measure

2012:1750 2013:1750 2014:1750 2015:1750 2016:1750

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Number of volunteers that helped with program leadership or delivery.

2. Outcome Type : Change in Action Outcome Measure

2012:2500 2013:2500 2014:2500 2015:2500 2016:2500

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 4

1. Outcome Target

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

2. Outcome Type : Change in Condition Outcome Measure

2012:1 2013:1 2014:1 2015:1 2016:0

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

A variety of factors influence potential outcomes in Pest Management. Public policy and regulations can influence the research needs and the delivery of research results to stakeholders through Cooperative Extension and technology transfer. Natural disasters (e.g., drought and floods) impact research work and occasionally dictate Cooperative Extension programming priorities. Appropriations could have impact (positive or negative) on recruiting and retention of AES and CES personnel.

It is our hope that key programs will continue to grow in future years, but the challenge of reduced federal funding for agricultural research and extension dictate that we anticipate maintaining current levels of output.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Other (Direct Observation)

Description

The evaluation of programs will follow the KASI method of measuring changes in knowledge, attitude, skills and impact, along with changes in behavior as outlined in the Logic Model. Specific methods will depend on the type of changes and impact measures needed. Evaluation instruments will be selected from alternatives available at <http://www.extension.psu.edu/evaluation/Questions.html>.

2. Data Collection Methods

- Sampling
- Whole population
- Mail
- Telephone
- On-Site
- Structured
- Case Study
- Observation
- Tests
- Other (Focus Groups)

Description

Data collection methods will depend on the needs of the issue team. Issue teams are charged with the development of evaluation methods. Again, the appropriate evaluation method will be identified and implemented using selections from the <http://www.extension.psu.edu/evaluation/Questions.html>.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Global Food Security and Hunger

2. Brief summary about Planned Program

This priority science area will focus and capture the efforts of multidisciplinary program teams across the system. No program focuses exclusively on new science and outreach to boost U.S. agricultural production, improve global capacity to meet the growing food demand, and foster innovation in fighting hunger by addressing food security for everyone, but especially for vulnerable populations. However, multiple areas of research and extension programs contribute to this area. We will continue to refocus and redirect existing research and extension activities that can be captured within this priority area. Programs areas that will contribute to this new focus will include but not be limited to existing and new research and extension programs addressing agriculture productivity. Programs will not only help producers increase production but also improve sustainability. New discoveries in biotechnology will add value as exports to developing nations. Hunger experienced by specific local, regional, or national, populations can be the effect of climate and weather conditions for a specific geographic area and by incidents such as a natural disaster or political unrest. Food shortages and hunger for special populations can be alleviated by planning and implementing strategic educational initiatives to address the uncertainty of the events of the future. Assuring an adequate and safe food supply for local and world populations begins at the most local level; the farm. Research and extension will continue to provide growers with the science-based information to enhance production without negative environmental impact. Enhanced local and regional food systems will reduce environmental impact including a reduced carbon footprint. As world populations increase, U.S. food production capability will become instrumental in addressing the need for more food. Penn State developed Technology and modern science based resources can be a solution to help solve world hunger when exported and adopted by food producing nations around the world. Hunger is real, but can be minimized if not eliminated by adoption of sustainable food production methods based on research and extension programs that focus on efficiently increased production with a sustainability and environmental stewardship focus. Processing and manufacturing of food products is a major economic contributor for local, state, regional and national food sectors. Pennsylvania is a leader in the industry. Research and extension programs will continue to partner with the food manufacturing and processing industries to ensure safe, wholesome products entering the food chain from Pennsylvania growers and processors.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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% | | 36% | |
| 611 | Foreign Policy and Programs | 25% | | 46% | |
| 722 | Zoonotic Diseases and Parasites Affecting Humans | 40% | | 18% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Three billion additional people to feed, shrinking amounts of arable land, climate change, increased natural disasters, energy and environmental issues, pests and diseases, political and social issues; all these factors and more will affect the future availability of food for a hungry world. More food will be needed. Across the food sector continuum, science-based research and education can address the increasingly complex issues facing producers, processors, manufacturers, distributors, and consumers. At the federal level, food safety, food security, and food availability have been elevated to the highest priority for our nation. There is expectation that the United States food system can rise to the challenges of feeding more people with less land, under increasingly challenging economic, social, political, and environmental conditions. The research and Extension system is a proven leader to discovery of answers, and implementation of solutions to feed the world. Research and Extension programs to enhance production efficiency through genetic genotype enhancement, reproductive and yield enhancement, and adjustment to more widely variable environmental conditions will result in more plant and animal food sources. Land use planning protects valuable production capability for crops and livestock. Integrated pest management and precision feeding and nutrient management practices reduces the use of pesticides, fertilizers and nutrients that can have a negative effect on the food that is produced and on the environment. Adoption of business planning and continuity of operations planning for food producers and food processors reduces the effect of risk and disasters including weather and terrorists activities that would negatively affect the food supply and consumer confidence in the food system. Nutrition education programs for underserved, hard to reach and vulnerable populations results in the ability for those food consumers to purchase, store, prepare, and serve to their families, a more nutritious and healthy diet while reducing the cost of food.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Programs will be dependent upon: enhanced competitive grant success; multi-state, multi-disciplinary task force approach; holistic approach to solve multiple problems simultaneously which will require integrated research in both basic and applied research and then translated to extension programs across several disciplines; research and extension will need to work together to identify issues and efforts to solve problems not symptoms; enhanced local community interaction with partners and collaborators; and environmental regulations and policies. Organized direction via the US Government's Feed the Future initiative would help ensure best utilization of scarce resources in this priority area.

2. Ultimate goal(s) of this Program

The ultimate goals for research and extension activities in Global Food Security and Hunger are to keep Pennsylvania and United States agriculture competitive while reducing global food insecurity. More diverse populations of individuals need to have a secure, affordable, and safe food supply. Agriculture producers need to adopt production practices that are economically and environmentally favorable that will allow them to maintain a sustainable and competitive position in the world market. Specifically, more producers will adopt sustainable practices; enhanced control of greater numbers of diseases and pests with minimal economic, environmental, and social impact; reduction in real and perceived risks associated with the use of genetically modified varieties and species, antibiotics, and pesticides; increased productivity with fewer inputs; and increased expertise and technology that can be exported globally.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

| Year | Extension | | Research | |
|------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| 2012 | 2.0 | 0.0 | 10.0 | 0.0 |
| 2013 | 2.0 | 0.0 | 10.0 | 0.0 |
| 2014 | 2.0 | 0.0 | 10.0 | 0.0 |
| 2015 | 2.0 | 0.0 | 10.0 | 0.0 |
| 2016 | 2.0 | 0.0 | 10.0 | 0.0 |

V(F). Planned Program (Activity)

1. Activity for the Program

Research and extension will partner to identify the changing needs of individuals, families, businesses, communities, and larger populations. Increased market analysis and needs assessment will determine the critical questions and needs of various populations that can be addressed and solved through the land-grant mission. Program advisory groups and other government and non-government stakeholder groups will be encouraged to work collaboratively across disciplines. Trans-disciplinary teams will take a more global approach to problems that affect global food security and hunger. There will be an effort to help society understand the inter-connectiveness and complexity of the food and agriculture system and how the decisions and actions of a single individual may affect others down-stream, down-

wind, across the community, or on the other side of the globe. We have become a more global community and we must continue to educate our audiences about the complex food and agriculture system. At the local level, research and Extension programs will help producers increase yields and improve the sustainability of production agriculture. Extension education will improve the competitive edge for food producers, processors, distributors, and retailers. Consumer nutrition education will result in a population that is more capable of making food purchasing decisions that will provide a more nutritious, safer, more economical, and healthy diet. Processors will be educated to improve quality control management. A variety of educational methodology will be deployed including one-on-one, group education, conference and workshops, published information, web-based information and web-based interaction. Teams of scientists, educators, and industry and agency representatives, will collaborate to provide a more comprehensive approach than what can be accomplished by any one entity. Market enhancement at the local, regional, and worldwide will be a priority.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

| Direct Methods | Indirect Methods |
|--|--|
| <ul style="list-style-type: none"> ● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations | <ul style="list-style-type: none"> ● Newsletters ● Web sites |

3. Description of targeted audience

The Food and Agriculture sector audience is very diverse and complex and includes a wide range from producers to consumers. Targeted audiences will include farmers who raise small fruit, tree fruit, vegetables, or agronomic crops used for human food; agronomic crops used for animal feed, dairy producers, livestock producers, poultry producers, aquaculture producers, and other specialty crop and unique food product producers; commodity organizations that represent the various crop and animal food products and the distribution of these products; companies that process and manufacture food from the raw materials; and local, state, and federal agencies who have interest or responsibility for the safety and security of food products. Within the food service area, restaurant, institutional food preparation, grocery stores, and food serving entities are a targeted audience specifically for safe food handling and preparation education from Extension. The consuming public, every person, is also a target audience; including resource limited individuals and families. Educational programs teach individuals about diet, nutrition and healthy eating, food budgeting, and food safety. Global populations, developing and stressed nations, and the agriculture commodity producers and consumers world-wide will be a new audience that will benefit from research of discovery and outreach of education.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

| | Direct Contact Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|------|-----------------------|--------------------------|-----------------------|-------------------------|
| Year | Target | Target | Target | Target |

| | Direct Contact Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|-------------|------------------------------|---------------------------------|------------------------------|--------------------------------|
| Year | Target | Target | Target | Target |
| 2012 | 3700 | 12400 | 0 | 0 |
| 2013 | 3700 | 12400 | 0 | 0 |
| 2014 | 3700 | 12400 | 0 | 0 |
| 2015 | 3700 | 12400 | 0 | 0 |
| 2016 | 3700 | 12400 | 0 | 0 |

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

2012:1 2013:0 2014:1 2015:0 2016:1

3. Expected Peer Review Publications

| Year | Research Target | Extension Target | Total |
|-------------|------------------------|-------------------------|--------------|
| 2012 | 0 | 0 | 40 |
| 2013 | 0 | 0 | 40 |
| 2014 | 0 | 0 | 40 |
| 2015 | 0 | 0 | 40 |
| 2016 | 0 | 0 | 40 |

V(H). State Defined Outputs

1. Output Target

- Number of invention disclosures submitted.

2012:0 2013:1 2014:0 2015:1 2016:0

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

2012:4700 2013:4700 2014:4700 2015:4700 2016:4700

V(I). State Defined Outcome

| 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 Target

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

2. Outcome Type : Change in Knowledge Outcome Measure

2012:1600 2013:1600 2014:1600 2015:1600 2016:1600

3. Associated Knowledge Area(s)

- 606 - International Trade and Development
- 611 - Foreign Policy and Programs
- 722 - Zoonotic Diseases and Parasites Affecting Humans

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

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

2. Outcome Type : Change in Action Outcome Measure

2012:20 2013:20 2014:20 2015:20 2016:20

3. Associated Knowledge Area(s)

- 606 - International Trade and Development
- 611 - Foreign Policy and Programs
- 722 - Zoonotic Diseases and Parasites Affecting Humans

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Number of volunteers that helped with program leadership or delivery.

2. Outcome Type : Change in Action Outcome Measure

2012:350 2013:350 2014:350 2015:350 2016:350

3. Associated Knowledge Area(s)

- 606 - International Trade and Development
- 611 - Foreign Policy and Programs
- 722 - Zoonotic Diseases and Parasites Affecting Humans

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect 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)

Description

Resources allocated to support research and extension are stressed in a changing economy. Genetic and biometric advances in breeding and varieties have a direct correlation to yield and sustainability. Climate change and changing weather patterns, which results in local to national environmental variations, result in immediate changes in yield and longer term challenges for sustainability. Weather anomalies such as extreme drought, severe cold, ice, hurricanes, tornadoes, hail, early and late frost, flooding, earthquakes, etc., will all have a local to regional impact on productivity and yield. Political conditions affect local to national populations negatively as food shortages lead to hunger. Invasive and new pests and diseases typically have a negative effect on production and sustainability. The world economy, national economies, and the vitality of local communities can have a negative effect on the ability of individuals and families to afford adequate,

safe, and nutritious food. Increased emphasis on environmental impact may affect current and future production practices. The economy and availability of energy sources will have a direct effect on productivity, processing, distribution and availability of food for everyone. Economically challenged populations will be more dramatically affected and may need to be addressed uniquely.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants

Description

Qualitative and quantitative measurement will be needed to assess the impact from scientific discovery and application of science-based solutions to problems affecting individuals, families, businesses, and communities. Evaluations will measure outcomes to improved health, improved economic situation, more sustainable businesses, more resilient communities, more localized food systems, less risk to the food system, improved safeguards to the food and agriculture system, increased yields, lower or steady cost of production, improved environmental conditions, and improved water quality. Scientific predictive modeling will provide measurement of the effectiveness of educational intervention for the improved surveillance and detection for pests and diseases.

2. Data Collection Methods

- Sampling
- On-Site
- Structured
- Unstructured
- Case Study
- Observation
- Tests
- Other (Small Group Interventions)

Description

With increased emphasis on solving problems, the philosophy for evaluation and data collection will need to migrate more towards practice change and adoption of best management practices which can be documented by a positive impact. Numbers of contacts, improved knowledge, and improved attitudes about problems facing society will be important, but the true measure of effectiveness and the documentation of a positive return on investment in resources will need to be measured by positive impact; how the adoption of science-based answers to real questions from the public results in positive economic gain, increased yield, more nutritious, safer and affordable food to more diverse and more widely distributed populations. With increased capabilities to scan larger numbers of samples with more precise analysis, food, water and air quality standards can continue to improve. Post delivery (follow-up) assessment will provide a more accurate assessment of mid- and longer-term impact for educational intervention. Pre- and post-assessment will provide short-term perceived impact of educational intervention, but to significantly have a positive impact on solving global food security and hunger problems, there will need to be longer term assessment of impacts. Longer term interaction with

clientele will provide documentation for trends that occur as the result of education.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Climate Change

2. Brief summary about Planned Program

Programs will address the full breath of climate change sciences spanning physical, biological, and social uncertainties, risks, and responses, those that are underway as well as those on the frontier. Robust research and extension will foster interdisciplinary, multi-functional teams and approaches that will link multiple institutions and span, connect, and garner resources that can measure, forecast, and specify the complexities of climate change in context to priority sectors including water quality and quantity, air quality (greenhouse gas emissions, carbon sequestration in working lands), risk assessment, and decision making as well as the emerging paradigms for sustainable agriculture and forestry. Research and extension will support carbon sequestration, mitigation of greenhouse gases, and development of science informed policies for supporting management of multi-functional working lands with enhancement of the ecosystems services they can provide. Furthermore, the stresses of change on biodiversity from the molecular through population levels will be critically addressed within this approach. Interdisciplinary, multifunctional teams are essential to the identification of critical gaps and for addressing the emerging frontiers within climate change that will enable the integrated approaches necessary for addressing the complexities of climate change. The issues and impacts that PA AES and CES will address through research and outreach: climate change uncertainties, risk management, climate futures and forecasts, water resources, forests and wildlife, aquatic ecosystems and fisheries, agriculture production and insurance, energy, economic barriers and opportunities. Research and extension emphasis will be placed on forecasts, impacts, and regional vulnerabilities for agriculture, forests, and human populations, and decision-making tools for adaptive management by sector.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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% | | 2% | |
| 111 | Conservation and Efficient Use of Water | 15% | | 6% | |
| 132 | Weather and Climate | 13% | | 6% | |
| 133 | Pollution Prevention and Mitigation | 15% | | 33% | |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants | 15% | | 25% | |
| 306 | Environmental Stress in Animals | 15% | | 6% | |
| 605 | Natural Resource and Environmental Economics | 12% | | 22% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

AES and CES have partnered with the Commonwealth of Pennsylvania in response to Pennsylvania's Act 70 of 2008 which mandated a specific analysis of the potential impact to multiple sectors in response to climate change. Researchers developed the Pennsylvania Climate Impact Assessment (June 2009), which inventories the potential impacts of global climate change on Pennsylvania's climate, human health, the economy and management of economic risk, forests, wildlife, fisheries, recreation, energy, agriculture, and tourism. The assessment comprehensively identifies both the opportunities and barriers created by the need for alternative sources of energy, climate-related technologies, services and strategies, carbon sequestration technologies, capture and utilization of fugitive greenhouse gas emissions, and other mitigation strategies. The assessment used a mixture of approaches including integrated quantitative modeling of sectors and extensive stakeholder engagement. While the findings are based on readily available data, literature, and preliminary quantitative analyses, a more in depth analysis is required because of the currently limited scientific literature addressing the impacts of projected climate change in Pennsylvania. The primary findings under selected warming scenarios include: 1) annual precipitation is expected to increase between six and ten percent, 2) warming will lead to longer growing seasons with corresponding frost day decreases, 3) precipitation will become more extreme with longer dry periods and greater intensity of precipitation and 4) there is substantial uncertainty relative to future tropic and extra-tropical cyclones for the state (including suggestions of fewer storms with increased intensity). Research and extension expected to stem from the assessment address all aspects of adaptive management, risk communication, and sector specific responses. Extension has established a program team within the Renewable Natural Resources group titled "Climate Change and Renewable Natural Resources" which is focused on translating models for incorporation at the forest manager level given that 70% of Pennsylvania forests are under private ownership providing extensive need and opportunity for implementation of adaptive management strategies that will increase the likelihood of sound science-based land use decisions.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

The assumptions made for this program focus largely on Pennsylvania specific research and extension as assessed for Pennsylvania audiences, decision makers, and sectors. However, development of research and extension approaches for climate change sciences will be applicable across the Mid-Atlantic region, within the Chesapeake Bay-, Great Lakes-, and Ohio/Mississippi River watersheds. Climate change studies necessitate scaling from the local stream reaches and local water quality/quantity impacts up to the watershed-, regional-, and estuary/bay levels. Research focused on place-based adaptive management strategies will result in scalable approaches for informing decision making at higher order physiographic scales. Penn State has demonstrated through its leadership for CARA (Consortium for Atlantic Regional Assessment "...anticipating and planning for changes in land cover and climate -- regionally and locally" that it effectively facilitates multi-institutional research and delivery approaches. A continued emphasis on building multi-institutional approaches will be a high priority for addressing regional to global research and Extension questions that will inform stakeholder groups and sectors on adaptive strategies.

2. Ultimate goal(s) of this Program

The climate change planned program area will seek to address high priority research and extension that will explore and educate these primary areas: 1) climatic drivers of change, 2) monitoring of changing conditions across sectors, 3) impacts of changing climate for agriculture, forestry, water quality and quantity, ecosystems, human population, and 4) strategies for adaptive management.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

| Year | Extension | | Research | |
|------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| 2012 | 3.0 | 0.0 | 14.0 | 0.0 |
| 2013 | 3.0 | 0.0 | 14.0 | 0.0 |
| 2014 | 3.0 | 0.0 | 14.0 | 0.0 |
| 2015 | 3.0 | 0.0 | 14.0 | 0.0 |
| 2016 | 3.0 | 0.0 | 14.0 | 0.0 |

V(F). Planned Program (Activity)

1. Activity for the Program

The "Climate Change and Renewable Natural Resources" Extension program will reach private forest landowners (responsible for 12 million forested acres across the Commonwealth) to increase working knowledge on forest management options for increasing carbon sequestration, mitigation of long-term climate change, reduction of carbon emissions, and potential participation in environmental markets for ecosystem services. This program will increase understanding of climate change impacts on Pennsylvania's natural resources, increase the ability of forest managers/owners to participate in emerging markets, and to offset emissions through improved forest management practices. The program will deliver a climate change webinar series. In addition to the renewable natural resource Extension webinar series, an on-going delivery mechanism that targets practitioners working with Pennsylvania producers will continue to feature whole farm systems approaches to greenhouse gas (GHG) reduction and mitigation. This program is delivered through webinars and incorporates research and Extension on best practices for air and water quality protection including best management practices (BMPs) that reduce emissions of GHGs. Researchers in Dairy and Animal Sciences, Poultry Sciences, Crop and Soil Sciences, Agricultural and Biological Engineering, and Agricultural Economics and Rural Sociology serve as the content specialists for framing the Extension messages for whole farm emissions reduction and GHG mitigation. Research approaches will identify risk management and communications that will inform working land management options for adaptations of agriculture to climate change, develop tools (online tutorials, information sheets, calculators, etc) to assist the suite of local, state, and federal agencies and collaborating nongovernmental agencies in the evaluation and selection of management strategies for multiple scales ranging from individual farms/working lands to watersheds and larger basins. Regionally unique collaboration will be sought which will team researchers, extension educators, federal, state and local governments and environmental/conservation/agricultural nongovernment organizations (NGOs) to find effective solutions to problems and resolution to issues. This approach will broadly seek active stakeholder engagement in both the research elements and tool development.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

| Direct Methods | Indirect Methods |
|--|---|
| <ul style="list-style-type: none"> ● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations | <ul style="list-style-type: none"> ● Newsletters ● TV Media Programs ● Web sites ● Other 1 (Webinars) |

3. Description of targeted audience

The audiences served include municipalities, planning agencies, citizens groups and associations, farm and forest managers, conservation practitioners, agriculture and forest industry, regional, state, and federal agencies, local municipalities, and energy consumers.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

| | Direct Contact Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|-------------|------------------------------|---------------------------------|------------------------------|--------------------------------|
| Year | Target | Target | Target | Target |
| 2012 | 34500 | 300000 | 50 | 0 |
| 2013 | 34500 | 300000 | 50 | 0 |
| 2014 | 34500 | 300000 | 50 | 0 |
| 2015 | 34500 | 300000 | 50 | 0 |
| 2016 | 34500 | 300000 | 50 | 0 |

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

2012:3 2013:1 2014:3 2015:1 2016:3

3. Expected Peer Review Publications

| Year | Research Target | Extension Target | Total |
|-------------|------------------------|-------------------------|--------------|
| 2012 | 0 | 0 | 200 |
| 2013 | 0 | 0 | 200 |
| 2014 | 0 | 0 | 200 |
| 2015 | 0 | 0 | 200 |
| 2016 | 0 | 0 | 200 |

V(H). State Defined Outputs

1. Output Target

- Number of invention disclosures submitted.

2012:1 2013:0 2014:1 2015:0 2016:0

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

2012:44000 2013:44000 2014:44000 2015:44000 2016:44000

V(I). State Defined Outcome

| 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 Target

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

2. Outcome Type : Change in Knowledge Outcome Measure

2012:800 2013:800 2014:800 2015:800 2016:800

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

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

2. Outcome Type : Change in Action Outcome Measure

2012:20 2013:20 2014:20 2015:20 2016:20

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Number of volunteers that helped with program leadership or delivery.

2. Outcome Type : Change in Action Outcome Measure

2012:1750 2013:1750 2014:1750 2015:1750 2016:1750

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Other (Extramural Funding)

Description

Extramural funding for the research gaps identified is paramount and will continue to be sought on a competitive basis.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Before-After (before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants

Description

Extension programs will be evaluated through application of pre- and post program survey instruments including online-based, interview, and comparative studies.

2. Data Collection Methods

- Sampling
- On-Site
- Unstructured
- Case Study

Description

Data collection consists of sampling of program participants, on-site surveys, and interviews. Additional methods will continue to be developed and applied for increasing robustness of collection and evaluation.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Sustainable Energy

2. Brief summary about Planned Program

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. In response we have initiated a comprehensive outreach program to understand the potential community, economic, and environmental issues associated with the development of the Marcellus Shale resource in the state. Outreach includes the development of webinars, meeting conferences, newsletters, tours, and factsheets on understanding the potential of the resource, gas leasing considerations, and other topics related to the development of the resource. Engagement with county commissioners, state government agencies and officials, and the industry is a critical part of the outreach effort. Renewable energy development that has minimal environmental impacts and limited effects on food and feed prices presents new opportunities and challenges for our clientele. The development of alternative energy strategies is also a function of federal, state, and local policies that either subsidize or restrict development. The AES strives to identify regionally adapted renewable energy solutions and develop the supporting research and outreach programs to help foster the appropriate development of these technologies. We have continued to develop an outreach program 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. Our clientele need an understanding of the feedstock production and availability, sustainable harvest strategies and cost, feedstock logistics, and the optimum methods of utilizing the resource most efficiently. Outreach education on these topics must be developed and shared with the public, communities, and potential project developers. Case studies of successful projects and on line monitoring systems of new projects are being developed. Research initiatives have included evaluations of cropping systems on dairy farms, development of novel bioenergy crops such as jatropha, canola and camelina, development of sustainability criteria for harvesting crop residues, and evaluations of cost and logistic issues associated with the harvest of woody biomass for energy. Faculty and extension staff 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.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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% | | 19% | |
| 131 | Alternative Uses of Land | 20% | | 62% | |
| 202 | Plant Genetic Resources | 40% | | 19% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

A rapidly changing situation in the sustainable energy issue has caused the AES to continue to adapt to needs of our clientele base. The discovery of a significant Marcellus Natural Gas resource has generated an unprecedented need for information on wide range of topics for a diverse clientele ranging from landowners, local government officials, concerned citizens. Initially the interest focused on the potential of the resource and potential economic considerations, but rapidly evolved into environmental, community impacts, and financial management issues. Public concern has intensified on taxation and water quality issues during the past year. Since 2004, state and federal initiatives have encouraged the development of alternative energy resources in the state. At the federal level, the Renewable Fuel Standard has provided mandates for alternative fuels such as ethanol and biodiesel and has recently been updated to include advanced biofuels from a wider array of feedstocks and processing technologies. Federal tax credits for biofuels have resulted in a rapid expansion of the industry in Pennsylvania with ethanol production capacity in the state now exceeding 100 million gallons/year and biodiesel capacity at over 50 million gallons per year. At the state level, renewable power standards have stimulated the development of solar, wind, biomass, and other renewable energy production tactics. Low natural gas prices due to the development of the Marcellus shale resource has slowed investment in some renewables, but volatile oil prices have again caused an increase in the development of combustion technologies that can help to reduce the states dependence on fuel oil as a heating source and renewed interest in alternatives to gasoline.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Funding will remain constant or increase in support of this planned program. Marcellus development will continue in the state and our programs will evolve to meet the needs of clientele. Development will likely expand across the state and experiences from initial lease and drilling will provide a basis for future programming. As renewable energy technologies evolve and mandates for increased levels of renewable and alternative energy there will be a need for research and outreach associated with the development of these technologies and government policies.

2. Ultimate goal(s) of this Program

The ultimate goal the sustainable energy program is to help society develop sustainable energy resources from traditional sources such as natural gas and also from renewable resources such as wind, solar, waste, woody biomass or energy crops in the state. As part of this goal, our institution can provide a research and development role for some of these technologies and provide a voice in the science based development of effective state and local policies surrounding these energy resources. Our goal is also to create an informed clientele through our educational programs who make informed decisions regarding energy development that lead to a more sustainable future for our state and nation.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

| Year | Extension | | Research | |
|------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| 2012 | 14.0 | 0.0 | 4.0 | 0.0 |
| 2013 | 14.0 | 0.0 | 4.0 | 0.0 |
| 2014 | 14.0 | 0.0 | 4.0 | 0.0 |
| 2015 | 14.0 | 0.0 | 4.0 | 0.0 |
| 2016 | 14.0 | 0.0 | 4.0 | 0.0 |

V(F). Planned Program (Activity)

1. Activity for the Program

Plans for Marcellus education going forward include outreach and research on a variety of related topics. These will utilize the expertise available within the Marcellus Education Team, from other researchers across the University system, and colleagues at land-grant institutions in the Appalachian basin impacted by Marcellus shale development. From the outreach side, we are planning to enhance and expand the delivery of information via webinars, video conferencing, on-line content, and through planned in-person seminars. Currently we are conducting 15 face to face educational sessions per month and we anticipate increasing the offerings to 20/month. Increased use of public media as an outreach tool is currently expanding, and we have in motion several projects with the public broadcasting units at PSU to reach the constantly expanding stakeholder audiences throughout the Commonwealth. Our printed materials are in the midst of planned growth for the current programming year and we would anticipate 15 new offerings in the FY on Marcellus related topics. On the research side, we have 24+ projects in motion with expected data and outcomes planned in the first half of the current FY. Seven of these are internal "seed" grants of up to \$50K. One has already led to an externally funded follow-up study as designed (over \$400K). We also have several large multi-day conferences planned to address in greater depth the issues that are surfacing on this resource development in the state. One will target academic research on

a multi-state basis and allow greater understanding on what is known, where are the knowledge gaps, who is working on the topic, and what can be facilitated to foster team efforts on common topics spanning state borders.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

| Direct Methods | Indirect Methods |
|--|---|
| <ul style="list-style-type: none"> ● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations | <ul style="list-style-type: none"> ● Public Service Announcement ● Newsletters ● Web sites |

3. Description of targeted audience

This audience is broad and encompasses much of the general public, but focuses on landowners, energy project developers, state and federal agency personnel, extension educators, and state and local community leaders.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

| | Direct Contact Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|------|-----------------------|--------------------------|-----------------------|-------------------------|
| Year | Target | Target | Target | Target |
| 2012 | 48000 | 500000 | 30 | 300 |
| 2013 | 48000 | 500000 | 30 | 300 |
| 2014 | 48000 | 500000 | 30 | 300 |
| 2015 | 48000 | 500000 | 30 | 300 |
| 2016 | 48000 | 500000 | 30 | 300 |

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

2012:0 2013:1 2014:0 2015:1 2016:0

3. Expected Peer Review Publications

| Year | Research Target | Extension Target | Total |
|------|-----------------|------------------|-------|
| 2012 | 0 | 0 | 110 |

| Year | Research Target | Extension Target | Total |
|------|-----------------|------------------|-------|
| 2013 | 0 | 0 | 110 |
| 2014 | 0 | 0 | 110 |
| 2015 | 0 | 0 | 110 |
| 2016 | 0 | 0 | 110 |

V(H). State Defined Outputs

1. Output Target

- Number of invention disclosures submitted.

2012:0 2013:1 2014:0 2015:1 2016:0

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

2012:82500 2013:82500 2014:82500 2015:82500 2016:82500

V(I). State Defined Outcome

| 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 Target

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

2. Outcome Type : Change in Knowledge Outcome Measure

2012:1400 2013:1400 2014:1400 2015:1400 2016:1400

3. Associated Knowledge Area(s)

- 125 - Agroforestry
- 131 - Alternative Uses of Land
- 202 - Plant Genetic Resources

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

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

2. Outcome Type : Change in Action Outcome Measure

2012:30 2013:30 2014:30 2015:30 2016:30

3. Associated Knowledge Area(s)

- 125 - Agroforestry
- 131 - Alternative Uses of Land
- 202 - Plant Genetic Resources

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Number of volunteers that helped with program leadership or delivery.

2. Outcome Type : Change in Action Outcome Measure

2012:290

2013:290

2014:290

2015:290

2016:290

3. Associated Knowledge Area(s)

- 125 - Agroforestry
- 131 - Alternative Uses of Land
- 202 - Plant Genetic Resources

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Economy
- Appropriations changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Other (Extramural Funding)

Description

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. 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(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)

- During (during program)
- Case Study

Description

Evaluations have been and will continue to be conducted on attendees of the programs. These evaluations have provided our team with feedback on the needs of information by our stakeholders to guide and provide direction for our programming. Short term evaluations are completed and evaluated after each program/workshop. Additionally, we regularly monitor and seek feedback from sponsors and partners. The Marcellus Shale Program has common evaluation methods coordinated from a centralized office and Support Staff. This permits the team to evaluate programs statewide and monitor for quality control of delivery and information. The data will be utilized for several purposes. First, it will allow us to gauge our impact of programming and make corrections/improvements. It will permit us to better understand the needs of our stakeholders to meet their expectations for information delivery. Additionally, we can use the data to improve our delivery and maintain quality of our programming and insure consistency.

2. Data Collection Methods

- Sampling
- Mail
- Telephone
- On-Site
- Structured
- Case Study
- Observation
- Tests
- Other (Focus Groups)

Description

Data collection methods will consist of post program surveys of participants followed up by telephone interviews of selected participants to gauge long term impacts. Key participants and stakeholders will be evaluated using both structured and unstructured interviews throughout the year. Some individuals observation methods will be used to assess their actions and changes implemented based on their participation in programs or one-on-one contacts with fields staff.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Childhood Obesity

2. Brief summary about Planned Program

Families are a crucial link in teaching healthy behaviors. It is important that those behaviors involve good nutrition and physical activity as the cornerstone of preventing obesity in children and adolescents. Often, families are challenged both by time constraints and economic barriers to provide or prepare solid, balanced, and nutritionally viable meals to their children. Extension programs will use innovative interdisciplinary approaches to discover, translate, and apply how nutrition and physical activity can prevent disease and promote good health and well-being. Programs will use the socioecological model as a framework to address multiple factors that influence an individual's ability to change. Youth organizations, such as 4-H, will offer programs that help young people increase their knowledge and offer opportunities to improve healthy eating and physical activity habits.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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% | | 53% | |
| 724 | Healthy Lifestyle | 10% | | 7% | |
| 802 | Human Development and Family Well-Being | 5% | | 40% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

In order to reverse the trend of rising childhood obesity rates, prevention is the most effective approach. Research shows that the majority overweight children will become overweight adults. The most recent statistics indicate that 67% of the population in the United States is considered overweight or obese. Pennsylvania ranks 29th in comparison with other states in the nation. BMI statistics released in Pennsylvania in late 2008 indicated 35% of children in kindergarten through sixth grade at or above the 85th percentile BMI. Overweight and its risks and complications affect both urban and rural Pennsylvania. Twenty-seven percent of low-income 2-5 year olds in Pennsylvania are overweight, or are at risk for becoming overweight, compared to the 18 percent statewide-average number of overweight children.

Nationwide, up to 24 percent of African-American and Hispanic children are obese. In Pennsylvania, 12 percent of the children enrolled in the WIC Program (Women, Infants and Children) were overweight in 2001. These disparities continue into adulthood. In Pennsylvania, African-American women have a much higher prevalence of obesity (40 percent) than white women and African-American and white men (22, 26, and 25 percent respectively). Only 31 percent of U.S. adults report that they engage in regular leisure-time physical activity (defined as either three sessions per week of vigorous physical activity lasting 20 minutes or more, or five sessions per week of light-to-moderate physical activity lasting 30 minutes or more). About 40 percent of adults report no leisure-time physical activity. About 35 percent of high school students report that they participate in at least 60 minutes of physical activity on 5 or more days of the week, and only 30 percent of students report that they attend physical education class daily. As children get older, participation in regular physical activity decreases dramatically. In contrast to reported activity, when physical activity is measured by a device that detects movement, only about 3-5 percent of adults obtain 30 minutes of moderate or greater intensity physical activity on at least 5 days per week. Among youth, measured activity provides information on younger children highlights the decline in activity from childhood to adolescence. For example, 42 percent of children age 6-11 obtain the recommended 60 minutes per day of physical activity, whereas only 8 percent of adolescents achieve this goal. Obesity's costs can also be measured in dollars. One study notes that obesity-associated annual hospital costs increased from \$35 million during 1979-1981 to \$127 million during 1997-1999. In 2004, \$4.1 billion of the state's medical expenditures were attributable to adult obesity. On average, people who are considered obese pay \$1,429 (42 percent) more in health care costs than normal-weight individuals.

2. Scope of the Program

- In-State Extension
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Childhood obesity is a serious nationwide health problem requiring a population-based prevention approach. The goal is energy balance - healthy eating behaviors and regular physical activity to achieve a healthy weight while protecting health and normal growth and development. Preventing childhood obesity is a collective responsibility - multiple sectors and stakeholders must be involved in societal changes at all levels. It is anticipated that funding will increase to support the planned program as there is more national and state recognition that childhood obesity is a significant problem. Community/school based and environmental interventions are recommended as the most feasible ways to support healthful lifestyles for the greatest number of children and their families.

2. Ultimate goal(s) of this Program

1. Increase healthy eating and physical activity opportunities for Pennsylvania families. 2. Increase the percentage of youth who are at a healthy weight. 3. Increase the percentage of youth who consume a healthy diet. 4. Increase the percentage of adults and children who participate in the recommended amounts of physical activity.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

| Year | Extension | | Research | |
|------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| 2012 | 18.0 | 0.0 | 3.0 | 0.0 |
| 2013 | 18.0 | 0.0 | 3.0 | 0.0 |
| 2014 | 18.0 | 0.0 | 3.0 | 0.0 |
| 2015 | 18.0 | 0.0 | 3.0 | 0.0 |
| 2016 | 18.0 | 0.0 | 3.0 | 0.0 |

V(F). Planned Program (Activity)

1. Activity for the Program

Educational programs, interactive physical activity and activities designed to attract youth will be conducted in schools, in out-of-school locations, in camps, and in communities. Evidenced-based practices will be utilized to assure that the programs will be effective and produce positive results. Program partnerships will be strengthened with collaborators within the university, other universities, the counties, communities and state. A health-centered approach that focuses on the whole child - physically, mentally and socially will be used rather than a weight-centered approach. The emphasis is on living actively, eating in normal and healthy ways, and creating a nurturing environment that helps children recognize their own worth, and that respects cultural food and family traditions. A series of educational events and activities will be utilized to reinforce educational information and appropriate behavior practices. Parental and leader involvement will be included as an integral part of programs, highly encouraged and supported. The Harvest 4-Health program in collaboration with the state 4-H program and Master Gardeners will emphasize growing foods for healthy eating and gardening activities that promote physical activity.

2. Type(s) of methods to be used to reach direct and indirect contacts

| Extension | |
|--|--|
| Direct Methods | Indirect Methods |
| <ul style="list-style-type: none"> ● Education Class ● Workshop ● Group Discussion ● Other 1 (Growing Gardens) | <ul style="list-style-type: none"> ● Newsletters ● Web sites |

3. Description of targeted audience

Youth: Ages K-5 grades, Middle School: 6th-8th grades, Teens: 9th-12th grades, youth with parents in the military, 4-Hers. Adults working as After-school staff, Family and Consumer Science, Physical Education and Science Teachers working in collaboration with school nurses and community volunteers, Community Recreation Directors, Day Care Staff, Sports Directors, Parents and caregivers with children in grades 3-5.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

| | Direct Contact Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|------|-----------------------|--------------------------|-----------------------|-------------------------|
| Year | Target | Target | Target | Target |
| 2012 | 850 | 60000 | 2000 | 4000 |
| 2013 | 850 | 60000 | 2000 | 4000 |
| 2014 | 850 | 60000 | 2000 | 4000 |
| 2015 | 850 | 60000 | 2000 | 4000 |
| 2016 | 850 | 60000 | 2000 | 4000 |

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

2012:0 2013:1 2014:0 2015:1 2016:0

3. Expected Peer Review Publications

| Year | Research Target | Extension Target | Total |
|------|-----------------|------------------|-------|
| 2012 | 0 | 0 | 20 |
| 2013 | 0 | 0 | 20 |
| 2014 | 0 | 0 | 20 |
| 2015 | 0 | 0 | 20 |
| 2016 | 0 | 0 | 20 |

V(H). State Defined Outputs

1. Output Target

- Number of invention disclosures submitted.

2012:0 2013:1 2014:0 2015:1 2016:0

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

2012:7750 2013:7750 2014:7750 2015:7750 2016:7750

V(I). State Defined Outcome

| 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 Target

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

2. Outcome Type : Change in Knowledge Outcome Measure

2012:400 2013:400 2014:400 2015:400 2016:400

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle
- 802 - Human Development and Family Well-Being

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

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

2. Outcome Type : Change in Action Outcome Measure

2012:200 2013:200 2014:200 2015:200 2016:200

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle
- 802 - Human Development and Family Well-Being

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Number of volunteers that helped with program leadership or delivery.

2. Outcome Type : Change in Action Outcome Measure

2012:100 2013:100 2014:100 2015:100 2016:100

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle
- 802 - Human Development and Family Well-Being

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Economy
- Appropriations changes
- Government Regulations
- Competing Public priorities
- Other (Extramural Funding)

Description

Some child care, school, and community environments can influence children's behaviors related to food intake and physical activity. Unemployment of parents, government policies toward families, inflation, transportation, and food availability and types of healthy food are all factors. Alternatively, busy parents who work may not pay as much attention to providing adequate physical activity for their children and healthy food for their children resolving to prepackaged, processed and fast foods. The local environment related to playgrounds, safe bike paths, swimming pools, lighting, sidewalks, and unsafe neighborhoods affect child and family physical activity. Lack of access to affordable, healthy food choices in neighborhood food markets can be a barrier to purchasing healthy foods.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)

Description

Baseline data on BMI percentile at the beginning and six month post course will be taken. Goal-setting, change in knowledge, and change in behavior will be taken pre program and at the end of the course with selected six month follow up sites.

2. Data Collection Methods

- On-Site
- Observation

Description

Participant surveys and body measurements are analyzed to determine significant change. Data are compiled using a Survey Monkey evaluation tool.

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Food Safety

2. Brief summary about Planned Program

The Extension program will address food safety issues with consumers, producers, and the processing industry by providing training for certifications and informing the public and industry of food safety guidelines, policies and recommendations.

Collaboration with industry partners to mitigate the risks of food safety incidents and to develop functional and improved nutritional characteristics of foods and ingredients are an important driver of food science and related research. The proposed plan of work will conduct programs and research on interrelated aspects of the food system with the network of scientists and communicators with strengths in plant and animal sciences, food science, animal and human nutrition, veterinary medicine, economics, and business. This research will focus on technologies for preserving foods, development of enhanced diagnostic tools for detecting and identifying pathogens in the food system, and developing a systems approach to reduce the potential for contamination of the food system from production systems to the consumer. This will enhance Pennsylvania's role as a reliable producer and supplier of high quality, safe and nutritious food and food products and will aid in ensuring Pennsylvania's economic future.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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% | | 8% | |
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins | 60% | | 92% | |
| | Total | 100% | | 100% | |

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Awareness of the critical nature of the safety of our food supply from farm to table has increased dramatically in recent years. It is estimated that over 76 million foodborne illnesses, 325,000 hospitalizations, and 5,000 deaths occur in the United States each year. The economic impact of foodborne illness, in terms of medical care, lost wages and associated costs, is estimated to be in the

billions of dollars per year. The Healthy People 2010 and the USDA Dietary Guidelines also include the safety of foods in their recommendations, emphasizing that safe foods as well as nutritious foods are vital to good health.

In 1999, the Commonwealth of Pennsylvania passed the Food Employee Certification Act, which requires one supervisory employee from for-profit facilities that carry a Pennsylvania Department of Agriculture license to attend an approved food safety course and pass an approved examination. Cooperative Extension is in a unique position to provide the educational and testing components of this requirement in a local setting, thus providing convenient access to training for the owners and operators of these Pennsylvania businesses to maintain their licensure.

Recently more people have become sick after eating raw fruits and vegetables contaminated with harmful microorganisms. Most of the outbreaks have been traced to crops grown in other parts of the U.S. or in other countries. But microbial contamination of fresh produce can happen anywhere. As consumer demand continues to shift away from heat processed fruits and vegetables and toward fresh, ready-to-eat produce, Pennsylvania growers need to keep the food supply safe. Food safety has become a critical issue throughout the fresh produce industry as food service and retail buyers increasingly require growers and packers to develop and implement food safety plans.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Food safety risks will continue to be present regardless of the source of the food with globalization intensifying the potential for worldwide outbreaks, intentional contamination, and new pathogens. It is assumed that the global climate change will further exacerbate the situation. Contamination of foods by biological, chemical, and/or physical hazards throughout the food continuum will be present regardless of the agronomic or animal management practices used to produce foods. New and improved methods to assess and control these new or established hazards will be required.

2. Ultimate goal(s) of this Program

The ultimate goal is to create and transfer knowledge through an interdisciplinary and systems approach (from farm to the plate) to improve health and well being in Pennsylvania, the United States, and throughout the world. We envision that Penn State University will be a place where industry leaders, policy makers, and the public will come together for solutions to local and global health, wellness, and food safety and defense problems as or even before they arise.

As a result of the program, food handlers will:

- increase their knowledge in the area of food safety
- implement changes to enhance food-handling practices in their operation that prevent the

contamination of food

- train or share information on safe food handling with other staff in the establishment and on the farm
- meet requirements to apply for the Pennsylvania Department of Agriculture Food Employee Certification to maintain their operating license

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

| Year | Extension | | Research | |
|------|-----------|------|----------|------|
| | 1862 | 1890 | 1862 | 1890 |
| 2012 | 17.0 | 0.0 | 4.0 | 0.0 |
| 2013 | 17.0 | 0.0 | 4.0 | 0.0 |
| 2014 | 17.0 | 0.0 | 4.0 | 0.0 |
| 2015 | 17.0 | 0.0 | 4.0 | 0.0 |
| 2016 | 17.0 | 0.0 | 4.0 | 0.0 |

V(F). Planned Program (Activity)

1. Activity for the Program

High priority will be placed on conducting research to identify causal pathogens. Rapid detection of pathogens combined with an information network to trace the problem to the source is critical for timely intervention. Ensuring the health of Pennsylvania food animals will be an important activity. Research efforts will be directed toward identification of the biomolecular roles for nutrients in normal and abnormal human metabolism and the impact of production and processing methods on nutrient composition of foods. Novel processes for food safety and for production and bioprocessing of bio-based value added products will be studied as well as methods to improve the shelf life of processed foods. Dissemination of these research findings as new or continuing extension programming will provide a means for individuals, industry and communities to learn and change.

Workshops will address food safety for producers and processors. They include: Advanced HACCP Workshops to cover reassessment of E. coli 0157:H7 in beef establishments and intervention strategies to control the pathogen. The Food Defense Workshop covers the fundamentals of assessing and managing the risk associated with intentional contamination in food manufacturing facilities. Food Microbiology Short Course provides insight into the most recent developments of food-borne pathogens, toxins, and contaminants that may occur in a food plant environment. The Better Process Control School (BPCS) certifies supervisors of thermal processing systems, acidification, and container closure evaluation programs for low-acid and acidified canned foods.

Extension programs will be focused on providing the food system with practical and timely training and recommendations on how to manage the risks with emphasis on prevention and preparedness. The Penn State Food Safety website will serve as a portal for educational information on workshops, seminars, and newsletters that are directed toward specific target audiences for the purposes of education, information sharing and networking. Maintaining an open dialogue with food professionals in the private food industry will help to focus and emphasize which diet, food, nutrition, and food safety issues should be current priorities. From the industry perspective, the main protector of our food supply is not regulatory authorities but the food industry itself. Opportunities provided by extension, which include topics such as

Good Agricultural Practices for local producers, HACCP training for food and animal products processors and foodservices, ServSafe® for retail food, and extensive consumer education will be conducted.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

| Direct Methods | Indirect Methods |
|---|---|
| <ul style="list-style-type: none"> ● Education Class ● Workshop | <ul style="list-style-type: none"> ● Newsletters |

3. Description of targeted audience

Owners/operators of food establishments licensed in the state of Pennsylvania are required under the Food Employee Certification Act must have at least one staff member certified through a Pennsylvania Department of Agriculture approved food safety certification course. These establishments/operations include: Restaurants, Caterers, Grocery stores/convenience stores, vending operations, organizations running festival and fair food booths. Educational institutions, hospitals, nursing homes and other organizations or facilities that provide food services. Additionally, volunteers involved in preparing and serving food as part of fundraisers or civic events for nonprofit organizations. This includes individuals from the following organizations which serve food to the public: Volunteer Fire Companies, Religious Organizations, School organizations such as PTO's and Booster Clubs, Sports organizations such as Little League, Youth Basketball Leagues, Youth organizations such as 4H Clubs, Boy and Girl Scouts, Summer Camps, Fraternal and Service organizations such as Lions, Rotary, Sportsman Clubs, Personal Care Homes, Meals on Wheels, and other organizations serving food to the public that are exempt from the Pennsylvania Department of Agriculture Food Employee Certification Act requirement.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

| | Direct Contact Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|------|-----------------------|--------------------------|-----------------------|-------------------------|
| Year | Target | Target | Target | Target |
| 2012 | 6000 | 2000000 | 35 | 0 |
| 2013 | 6000 | 2000000 | 35 | 0 |
| 2014 | 6000 | 2000000 | 35 | 0 |
| 2015 | 6000 | 2000000 | 35 | 0 |
| 2016 | 6000 | 2000000 | 35 | 0 |

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

2012:0 2013:1 2014:0 2015:1 2016:0

3. Expected Peer Review Publications

| Year | Research Target | Extension Target | Total |
|------|-----------------|------------------|-------|
| 2012 | 0 | 0 | 30 |
| 2013 | 0 | 0 | 30 |
| 2014 | 0 | 0 | 30 |
| 2015 | 0 | 0 | 30 |
| 2016 | 0 | 0 | 30 |

V(H). State Defined Outputs

1. Output Target

- Number of invention disclosures submitted.

2012:1 2013:0 2014:1 2015:0 2016:1

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

2012:8000 2013:8000 2014:8000 2015:8000 2016:8000

V(I). State Defined Outcome

| 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 Target

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

2. Outcome Type : Change in Knowledge Outcome Measure

2012:2450 2013:2450 2014:2450 2015:2450 2016:2450

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

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

2. Outcome Type : Change in Action Outcome Measure

2012:150 2013:150 2014:150 2015:150 2016:150

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Number of volunteers that helped with program leadership or delivery.

2. Outcome Type : Change in Action Outcome Measure

2012:100

2013:100

2014:100

2015:100

2016:100

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Other (Extramural Funding)

Description

Food safety is recognized as a human health, national security and a major economic issue.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Before-After (before and after program)

Description

Uniform evaluation tools are available for extension educators to use to illicit information from program participants. These tools include a Food Safety Certification Training Evaluation, a Food Safety Certification Training Follow-up Survey, and a Restaurant Clientle survey.

2. Data Collection Methods

- On-Site
- Observation
- Other (Small Group Interaction)

Description

Each educator conducts a Food Safety Certification Training Evaluation after every ServSafe® training that measures knowledge and practice. They also have available a Food Safety Certification Training Follow-up Survey that can be distributed 3 to 6 months after the training. Additionally, a short survey is given to restaurants/institutions regarding their clientele that seeks information about average number of customers served per day, number of days a week open for business and number of people employed by the restaurant. This information is used to determine the potential impact of the training on people who are affected by quality food safety practices.