2014 University of Maryland - Eastern Shore and University of Maryland Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

The 2014 Accomplishment Report consists of the University of Maryland Extension (UME) at University of Maryland College Park and University of Maryland Eastern Shore(UMES), Maryland Agricultural Experiment Station (MAES), and Agricultural Experiment Station (AES) results and accomplishments. UME and MAES at the University of Maryland College Park (UMCP) are in partnership with AES at the University of Maryland Eastern Shore, and, as such, they coordinate their research and extension activities to the maximum extent possible.
In 2013, a new strategic planning process was undertaken to develop a 2014-2019 UME Strategic Plan. Building on University of Maryland Extension's strong programmatic foundation, the UME Strategic Plan-ning Committee (Appendix B) conducted extensive data collection in 2013 that reached out to all stakeholder groups: faculty and staff, clientele, and partnering organizations. Based on the data, specific goals, objectives, and strategies in four major areas were identified: Identity, Innovation, Infrastructure, Marketing & Visibility. The programmatic foundation for the 2014-2019 Strategic Plan builds on the four impact areas from the 2009-2014 Strategic Plan: Agriculture and Food Systems, Environment and Natural Resources, Healthy Living, and Resilient Communities and Youth Development. Programming to address these areas is developed in the traditional disciplines of 4-H Youth Development; Agriculture; Family and Consumer Sciences; and Natural Resources and Sea Grant. Similarly, MAES and AES developed its POW for 2013-2017 using the framework identified by NIFA. Similarly, the College of AGNR's draft strategic plan identifies four core research areas that MAES is leading and those are agriculture, natural resources and environment, human health and nutrition, and international engagement.

The plan for UME emphasizes key outcomes, impacts in critical areas, and "marshaling our intellectual resources" into non-formal educational programs that work together to deliver measurable results for the economy, the environment, and the community. This approach parallels that of UMCP, UMES, MAES, AES, and the College of Agriculture and Natural Resources to achieve impact on the big societal issues important to Maryland and, ultimately, to the global community.

The UME impact areas (referred to as Initiatives 1-4) represent major programmatic initiatives that UME directs resources to accomplish. These impact areas are a broad-based method of dividing the critical needs identified by the planning process into manageable units. Key outcomes are the goals within each impact area. Impact leadership teams consist of field-based Extension Educators, Extension Specialists, and Faculty Extension Assistants who work together to provide overall statewide leadership for programmatic efforts. These teams are responsible for collectively achieving the goals, measuring the impacts using suitable evaluation methods and tools, and reporting findings to stakeholders. Impact teams are linked to each other through common target and primary audiences served, the topics and subjects taught, and outcomes and impacts achieved. Impact leadership teams, across the major programmatic initiatives, develop signature programs that are replicable, measurable, and recognized at the state and national levels.

The MAES and AES coordinate research projects in the challenge areas identified by the USDA-NIFA. The research focus ranges from plant and animal genomics to nutrients, health, environment, and

economics of production systems. Both basic and applied research are conducted by the faculty and graduate students to cover the topics of important value to animal and plant production systems with both environmental and economic sustainability.

The four major program areas in the UME and MAES strategic plans are:
Initiative 1: LOCAL FOOD & AGRICULTURE SYSTEMS
Key Outcome: Agriculture and food production will be sustainable and profitable and produce a safe, abundant, affordable, and accessible food supply.
This initiative is reported under Planned Program, "Global Food Security and Hunger."
Initiative 2: ENVIRONMENT AND NATURAL RESOURCES
Key Outcome: Individuals and communities will become stewards to manage the environment for the mutual benefit of people, ecosystems, wildlife, natural resources, and economic interests.
This initiative is reported under Planned Programs, "Climate Change" and "Sustainable Energy."
Initiative 3: HEALTHY LIVING
Key Outcome: Youth, individuals, and families will make informed decisions about their health, finances, food, housing, and overall well-being.
This initiative is reported under Planned Programs, "Childhood Obesity," "Food Safety," and "Family & Community Resiliency."
Initiative 4: RESILIENT COMMUNITIES & 4-H Youth Development
Key Outcome: Improve human capacity to achieve desired community outcomes and be prepared to respond to uncertainties of economics, health, climate, and security.
This initiative is reported under Planned Programs, "Childhood Obesity, Food Safety," and "Family & Community Resiliency."
The 2014-2019 University of Maryland Extension Strategic Plan carries forward the land grant university mission; the goals of the University of Maryland, College Park, the College of Agriculture and Natural Resourc-es, and University of Maryland Eastern Shore; and the spirit of the Smith-Lever Act. Also, MAES carries forward the responsibilities of the Hatch Act in finding solutions posed to agricultural systems following USDA-NIFA's national priority areas and according to the research strategic plan of the College of AGNR.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	85.0	15.0	54.0	14.0
Actual	85.0	15.0	54.0	25.9

II. Merit Review Process

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

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

2. Brief Explanation

The merit review processes did not change from 2013. On July 1 of each year, UME faculty and staff receive a memo from the Associate Dean/Associate Director of Extension outlining the process and requirements.
The merit review process for UME faculty occurs annually when the faculty member is formally evaluated by the Program Leader (Assistant Director). The AGNR Program Leader evaluates AGNR Educators and Specialists; FCS Program Leader, the FCS Educators and Specialists; and the 4-H Program Leader, the 4-H Educators and Specialists. Input is obtained from the Area Extension Director (AED). Emphasis is placed on program impacts and the difference made to constituents and the residents of Maryland during the preceding 12 months. Each faculty member is evaluated on individual merit. Documents used for the merit review are approved Individual Extension Plan (IEP), Curriculum Vitae, UMERS reports, and Teaching Effectiveness Summary.

All research faculty have a departmental home, and while there are subtle differences between the departments, they all have a peer-review system wherein assigned faculty or a faculty committee review the annual performance criteria of each faculty member and assign a merit ranking. These criteria, from a research perspective are evaluated, in general, on grantsmanship, publications, the quality of the journal (based on a citation index), and invited and/or contributed scientific talks and seminars. These are also the same criteria that are used to evaluate promotion and tenure decisions. The peer committee recommendations are reported to the respective department chair who provides his/her input and then provides a final ranking and conducts the annual review. This process is followed for tenured, tenure-track, and research faculty appointments.

III. Stakeholder Input

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

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

Brief explanation.

Stakeholder participation is encouraged through local Extension Advisory Councils, 4-H Club leaders (volunteers), and various surveys (including needs assessments) targeted to UME clients. Social media strategies are also now being used to solicit feedback (Facebook, web sites, blogs). Text messages are also being used to reach stakeholders. In 2013, feedback listening sessions were held throughout the State of Maryland to solicit feedback for the new 2015-19 strategic plan.

The administrative officers of the MAES, AES, and UME sit on and attend a wide array of committees with the State's agricultural leaders. Such continuous contact with the agricultural leadership, including the Maryland Secretaries of Agriculture, Natural Resources and Environment,

provides additional contact to keep current the research and education issues examined by research and extension in the State's two land-grant universities. The groups include the Maryland Agricultural Commission, the Maryland Grain Producers Association, the Delmarva Poultry Industry, the Southern Maryland Agriculture Commission, the Maryland Association of Soil Conservation Districts, Department of Housing and Community Development, Maryland Department of the Environment, and many other similar groups. Both research and extension faculty also seek stakeholder inputs through their participation and presentation of their projects to stakeholder audiences in state, regional, and national workshops and conferences.

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

1. Method to identify individuals and groups

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

Brief explanation.

End-of-class surveys are used to gather input from individuals attending UME workshops and other events. In addition, follow-up surveys are conducted with stakeholders across all of the major program areas who have attended programs. In 2014, work started to conduct agricultural needs assessments first on the Eastern Shore of Maryland and then moving later into Western Maryland, Northern Maryland, Central Maryland, and Southern Maryland. In addition, a needs assessment of participants in the UMES Small Farms program was conducted in 2013-14.
The UME Facebook page is used as a method to solicit feedback from our stakeholders, as well as feedback from the UME and UMES web sites.
The College of Agriculture and Natural Resources utilizes a Dean's Leadership Council consisting of a broad cross-section of agricultural industry leaders to provide input on major directions for the College's research, teaching and extension agenda. The Advisory Council meets periodically to discuss rising issues in the State.
The administrative officers of the MAES, AES, and UME sit on and attend a wide array of committees with the State's agricultural leaders. Such continuous contact with the agricultural leadership including the Maryland Secretaries of Agriculture and Natural Resources and Environment provides additional contact to keep research and education issues examined by the research and extension in the State's two land grant universities. The groups include the Maryland Agricultural Commission, the Maryland Grain Producers Association, the Delmarva Poultry Industry, the Southern Maryland Agriculture Commission, the Maryland Association of Soil Conservation Districts, Rural Maryland Council, MARBIDCO, and many other similar groups.

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

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- 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
- 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

Brief explanation.

UME draws upon the expertise of approximately 145 UME Educators, Specialists, and administrators in ongoing, informal needs assessment. UME field-based educators solicit feedback from local Extension Advisory Councils and other stakeholder groups. Survey work with all groups participating in programs is performed on a regular basis to assess needs. Analysis of secondary data for Maryland is also used, including the updated data from the 2010 U.S. Census, the new 2012 agricultural Census data, USDA National Agricultural Statistics, Maryland Departments of Planning, Agriculture, Natural Resources, Economic Development, and Maryland Department of Health and Mental Hygiene (and many more) and environmental scanning at the national, regional, state, and local levels. In 2013-14, a national external environmental scan was undertaken by the UME strategic planning committee.

MAES and AES have identified state agencies such as the Maryland Department of Agriculture, Maryland Department of Natural Resources, and Maryland Department of Environment as stakeholders for the important role that they play in economics, environmental, diseases, and public policies related to diverse land uses. MAES and AES scientists also have identified USDA-ARS scientists from Beltsville, Maryland, and State College, Pennsylvania as stakeholders due to their common research interests. In addition, our own UME educators are the best research stakeholders because they often use the results of research conducted by the MAES and AES scientists to respond to questions from the public across the state. Therefore, MAES and AES collect input from all these entities by participating in joint committee meetings and other related communication platforms (e.g., workshops, conferences, etc.). MAES has also formed a Faculty Research Council composed of both research and extension faculty that will serve as another body of stakeholder input to identify research needs in 2014 and beyond

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
- Other (Strategic Plan Development)

Brief explanation.

Input from stakeholders was used to create the priorities for the UME strategic plan 2014-2019; determine statewide staffing plans for UME; develop new job descriptions for county and regional extension positions; develop new initiatives for the College and UME; allocate financial resources, primarily operating expenses for program and curriculum development; and, to assist in revamping

strategic initiatives as needed to deal with current budgetary shortfalls and staffing challenges. MAES and AES used the information obtained from the stakeholders to focus on research issues that are important to the state with respect to production, marketing, economics, public-economic-environmental policies, biotechnology, ecosystem services, animal and human health, energy issues, etc. This information, combined with the national priorities set by USDA-NIFA was used to set the research priorities and monitor progress.

Brief Explanation of what you learned from your Stakeholders

During the process of gathering input from Maryland residents for the 2014-2019 strategic plan, stakeholders helped to shape four strategic goals for UME:

1. Identity: Solidify UME's identity as the provider of excellent research-based educational programs in defined priority areas that meet the needs of Maryland's diverse population and are consistent with organizational capacity.
2. Innovation: Create and foster a culture of innovation that anticipates and responds to current and emerging needs of the organization and Maryland residents.
3. Infrastructure: Invest in human capital and organizational systems that foster a culture of inclusion, excellence, and engagement among faculty, staff, volunteers, and stakeholders.
4. Marketing and Visibility: Effectively communicate who we are; what we do; and the social, environmental, and economic importance of our work to clientele, volunteers, and stakeholders.

As seen in many other states, Maryland's residents are concerned about the quality of their food, health, environment, families, and youth.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
3412732	1356558	3123863	1553552

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	3412732	1356559	3123864	1406211
Actual Matching	3412732	1356559	3123864	1553552
Actual All Other	2922037	0	179900	0
Total Actual Expended	9747501	2713118	6427628	2959763

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	0	0	0	1165624

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Global Food Security and Hunger
2	Climate Change
3	Family & Consumer Sciences
4	Sustainable Energy
5	Childhood Obesity
6	Food Safety
7	4-H Youth Development

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	10%	10%	15%	33%
205	Plant Management Systems	10%	10%	10%	0%
216	Integrated Pest Management Systems	15%	10%	10%	0%
301	Reproductive Performance of Animals	0%	0%	0%	33%
311	Animal Diseases	10%	10%	10%	0%
503	Quality Maintenance in Storing and Marketing Food Products	5%	10%	5%	0%
601	Economics of Agricultural Production and Farm Management	10%	10%	10%	0%
602	Business Management, Finance, and Taxation	10%	10%	10%	0%
604	Marketing and Distribution Practices	10%	10%	10%	0%
608	Community Resource Planning and Development	10%	10%	10%	0%
704	Nutrition and Hunger in the Population	10%	10%	10%	0%
723	Hazards to Human Health and Safety	0%	0%	0%	34%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	26.0	4.0	16.0	1.0
Actual Paid	24.0	0.0	15.0	7.7
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
1194456	474795	1561932	595668
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1194456	474795	1561932	574139
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1022713	0	89950	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- UME, MAES, and AES will have a combined focus to ensure that Maryland agriculture and food production will be sustainable and profitable and produce a safe, abundant, affordable, and accessible food supply.
- Research coordinated through MAES and AES on crop and animal breeding, specialty crops, market analysis, economic sustainability, and policy analysis will be performed, while UME will be involved in local and regional efforts to assist agricultural and natural resource entrepreneurs.
- Research conducted through MAES, AES, and UME will generate vital information to increase productivity using genomics, breeding, and adaptation of alternate crops with economic and environmental sustainability.
- Through UME's Impact Teams and MAES, and AES's research projects, the following planned program activities will be emphasized: Integrated Pest Management (IPM); Value Added & Specialty Crops; Grow It-Eat It; Annie's Project; Best Management Practices in Crop and Animal Agriculture; Technologies for the Genetic Improvement of Crops and Animals; Agronomic Fruit & Vegetable Production; Dairy Analysis; and Small/Beginning Farmers Program.
- On-line educational programs, field trials, twilight tours, seminars, workshops, farm visits, on-farm research & demonstrations and individual farm consultations will be used to educate Maryland farmers, Agriculture industry professionals, Soil Conservation District personnel, USDA-NRCS conservationists and extension faculty.
- New research and technologies developed by the MAES and AES will be transferred via UME on-farm demonstrations and twilight tours.
- Training programs will be developed to improve nutrient management practices, IPM, diagnostic skills, identification and control of invasive species, water management practice improvements and reductions, biosecurity and animal health.

2. Brief description of the target audience

- Food Stamp Recipients
- Limited Income Families
- School age youth on free or reduced-cost meals
- New immigrants

- Students
- Plant growers and breeders
- Retailers
- Producers
- Female farmers
- Beginning farmers
- Socially disadvantaged farmers
- Small farms operators

3. How was eXtension used?

UME faculty participates actively in the Goat Industry Community of Practice by participating in the "Ask The Expert" feature. Also,contributes in uploading content on the use of small ruminants to manage unwanted vegetation.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	35833	7685793	26140	160000

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	22	51	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- IPM (Green Industry & Agronomic Crops): Fact sheets, short courses, workshops, field trials, twilight tours, curriculum, websites, grants awarded.

Year	Actual
2014	983

Output #2

Output Measure

- Community Resource & Economic Development: Publications, seminars, workshops, grants and curriculum developed.

Year	Actual
2014	36

Output #3

Output Measure

- Biosecurity, BMP's and Animal Health: In-service training, seminars, publications, grants, presentations, websites, research trials, and workshops.

Year	Actual
2014	53

Output #4

Output Measure

- Pasture Management, Rotational Grazing & Dairy Analysis: Pasture walks, variety trials, in-service training, grants, publications, budgets, websites, farm analysis performed & workshops

Year	Actual
2014	323

Output #5

Output Measure

- Grow It-Eat It: Number of workshops, publications and grants.

Year	Actual
2014	154

Output #6

Output Measure

- Agronomic, Fruit & Vegetable Crop Production: Number of variety trails, twilight tours, seminars, workshops, publications, and grants.

Year	Actual
2014	138

Output #7

Output Measure

- Small/Beginning Farmers and Annie's Project: Number of workshops, number of participants; publications, grants and new partnerships.

Year	Actual
2014	128

Output #8

Output Measure

- Number of research projects

Year	Actual
2014	0

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	IPM (Green Industry & Agronomic Crops): Number of IPM scouts and producers that can identify threshold level; number of pest management programs; Number implementing research based recommendations; certification in Pesticide Safety; field trails.
2	Community Resource & Economic Development: Number of business people, advisory groups, development agencies, rural leaders and potential farmers interested in developing new AGNR businesses; Business and marketing plans developed; Number of Communities integrating UME information for land use decisions and improved growth management concepts; Pubs developed; Number of people downloading AGNR enterprise information from MREDC web site; and Regional collaborations.
3	Bio-security, BMPs and Animal Health: Number of educational seminars held for producers, allied industry personnel and government workers; number of producers implementing biosecurity and BMP measures; new training curriculum developed.
4	Farm Management & Agricultural Profitability: Number of farmers/livestock owners adopting best management practices; Number of farmers/livestock owners adopting rotational grazing strategies; Number farmers (Dairy, Beef, Equine, Sheep/Goats) increasing profitability as a result of these programs; new variety trails; Extension, NRCS and SWCD personnel trained; new practices (BMPs & rotational grazing) recommended; and number of dairy farmers implementing changes as a result of Dairy Analysis.
5	Home Food Production: Number of Master Gardeners trained; Number of people establishing new back yard gardens; number of new community supported agriculture (CSA) gardens established.
6	Agronomic, Fruit & Vegetable Crop Production: Number of producers attending programs, twilight tours and workshops; Number producers/growers developing basic diagnostic skills in identifying invasive insects, diseases and weeds; Number of producers who write and update their own nutrient management plan; Number of producers adopting production management practices that will improve their profitability; Number of producers who increase profitability; Number adopting field research practices dealing with improved crop varieties, invasive species, weeds and diseases; Number adopting methods to be more efficient in their water use in livestock and crop production.
7	Small/Beginning Farmers (Agronomic & Green Industry): Number of new farm enterprises established as a result of our programs; Number successfully completing Annie's Project; Number of women who have implemented change in their family farming operation after attending Annie's Project; Number of new/beginning farmers and Annie's Project graduates participating in additional UME AGNR programs, twilight tours and workshops; and number of farmers who become certified in nutrient management planning and/or pesticide safety.
8	Research: Bovine Embryo Nutrient Utilization and Viability
9	Research: Global Survey of Snail2 Target Genes During Avian Growth and Development
10	Research: Deep Soil Nitrogen: A Resource for Profitability and Stewardship
11	Research: Development of Effective Vaccine Against Porcine Reproductive & Respiratory Syndrome Virus (PRRSV)

12	Research: The Environmental Concerns of Arsenic Additives in Poultry Litter
13	Research: Abiotic and Biotic Drivers of Productivity and Diversity in Worldwide Grasslands
14	Research: Biological Invasions and Sustainability of Managed Ecosystems
15	Research: The Influence of Cover Crops and Tillage on Soil Quality, Greenhouse Gas Emissions, Pest Community Dynamics, and Economics of Transitioning to Organic Farming
16	Research: Surface Properties, Transport, and Delivery of Protein-based Nanoparticles: Using Cationic β-lactoglobulin Nanoparticles as a Model System.

Outcome #1

1. Outcome Measures

IPM (Green Industry & Agronomic Crops): Number of IPM scouts and producers that can identify threshold level; number of pest management programs; Number implementing research based recommendations; certification in Pesticide Safety; field trails.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Pest management is a critical issue for agricultural producers. Management of pests must be done in a way which is economically feasible and environmentally sustainable. Over reliance/improper use of pesticides can result in development of resistance, residues on agricultural products, crop damage and damage to non target organisms such as beneficial insects and also exposure of agricultural workers and their families.

What has been done

Workshops were conducted for farmers on how to monitor insects, weeds, and diseases of field crops as a method of assessing the potential for economically important crop damage. Farmers learned techniques for implementing IPM by emphasizing a systems approach to production and pest management of field crops and the fundamentals of safe pesticide application that enable them to obtain certification or recertification as a private pesticide applicator.

Results

50 producers received up to date IPM information which assisted them in managing pests on their farms using methods which were effective, economically feasible, and environmentally sustainable.

28 producers received training which allowed them to renew private applicator certifications, assuring that they could continue applying pesticides safely while protecting the environment and in accordance with IPM principles. A positive impact of this education in 2014 was that there were only two complaints against private agricultural pesticide applicators (out of 40 total complaints) in the state of Maryland for the year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management
723	Hazards to Human Health and Safety

Outcome #2

1. Outcome Measures

Community Resource & Economic Development: Number of business people, advisory groups, development agencies, rural leaders and potential farmers interested in developing new AGNR businesses; Business and marketing plans developed; Number of Communities integrating UME information for land use decisions and improved growth management concepts; Pubs developed; Number of people downloading AGNR enterprise information from MREDC web site; and Regional collaborations.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual

2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Farming is a unique business that has strong ties to family, values and land. These strong ties lead to the need for outreach and education on risk management topics such as financial planning, estate planning, marketing, communication, computer programs, budgeting, insurance and much more. As profit margins slim and expenses rise the importance of mitigating these risks has increased.

What has been done
The MidAtlantic Women in Agriculture program engages, educates and empowers women on common issues in risk and farm management through a variety of learning environments. Classes include "Annie's Project" and "Managing for Today and Tomorrow." A Regional Women in Agriculture Conference is held annually and attended by approximately 175 people.

Results
Participants leave the program with a high intent to write business and marketing plans, use computers, check credit reports, prepare financial statement, update estate plans, and positively increase community and family relations. Writing business and marketing plans was an action that participants wanted to do (97%) and 39% actually followed through. Checking credit reports, updating estate plans, and positively increasing family communications were the actions that the greatest majority of participants engaged in.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
608	Community Resource Planning and Development

Outcome #3

1. Outcome Measures

Bio-security, BMPs and Animal Health: Number of educational seminars held for producers, allied industry personnel and government workers; number of producers implementing biosecurity and BMP measures; new training curriculum developed.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
For the last 25 years, rapid changes in demographics in the USA have resulted in a demand for lamb and chèvon (goat meat). According to a 2009 Agricultural Statistics, it has been estimated that more than 50 million people have a preference for lamb and/or chèvon in the United States. Since 1984, a steady increase on the number of goats slaughtered in USDA inspected plants has not been able to match the chèvon demand and there is a deficit when compared to the goat inventory in the nation. For example by January 1, 2013, there were 2.81 million goats in the USA. Until 2009, meat goats were the fastest- growing sector on the three types of goats (milk, fiber and meat); however, declining production and fairly stable consumption allows for importation of chèvon. With per capita lamb and mutton consumption fairly stable, imports have offset the decline in domestic production. Lamb and mutton imports, which currently account for nearly half of U.S. consumption, are mainly from Australia (about 68-70%) and New Zealand (about 30-32%).USA sheep and goat producers have a great opportunity if they target the demand and the proximity to large concentrations of chèvon consumers in Washington, DC; New York; Philadelphia; Baltimore; and Newark enhancing farm diversity and sustainability. Sheep and goat production is a great opportunity for small farmers to sustainably target lamb and chèvon demand. However, sheep and goat producers face at least two main challenges: a) gastrointestinal parasites (mainly Haemonchus contortus or barber pole worm) and b) reproductive performance, sheep and goats are seasonal breeders and it is hard to target market opportunities without any estrus synchronization practices. In general sheep and goat producers assume that sheep and goats are ?small cows? and neglect to obtain nutritional guidelines for their livestock. UME sheep and goat specialists train farmers on the recommended feeding and management practices, integrated parasite control, and breeding techniques including the use of controlled internal drug release (CIDR) devices.

What has been done
Two workshops titled ?Be smart?Drench Smart?, were conducted in Southern Maryland and at UMES with 30 participants. The workshops emphasized the use of the FAMACHA score card to identify critically parasitized animals for treatment. Such targeted treatment is aiming to slow progress of commercial anthelmintic resistance. In addition, alternative practices were proposed to the workshop participants to reduce the sheep and goats acquiring parasite eggs from pasture or holding facilities. Participants were also educated on sheep and goat nutritional requirements since a core practice to avoid livestock death is an adequate plane of nutrition.
Students, sheep and goat producers, and agriculturists have been instructed on the breeding seasonality of sheep and goats. Also, an alternative has been proposed by using CIDRs to synchronize estrus and target peak lamb and chèvon demand periods to enhance small farm operators? income.

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
311	Animal Diseases
601	Economics of Agricultural Production and Farm Management

Outcome #4

1. Outcome Measures

Farm Management & Agricultural Profitability: Number of farmers/livestock owners adopting best management practices; Number of farmers/livestock owners adopting rotational grazing strategies; Number farmers (Dairy, Beef, Equine, Sheep/Goats) increasing profitability as a result of these programs; new variety trails; Extension, NRCS and SWCD personnel trained; new practices (BMPs & rotational grazing) recommended; and number of dairy farmers implementing changes as a result of Dairy Analysis.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
301	Reproductive Performance of Animals
503	Quality Maintenance in Storing and Marketing Food Products
601	Economics of Agricultural Production and Farm Management

Outcome #5

1. Outcome Measures

Home Food Production: Number of Master Gardeners trained; Number of people establishing new back yard gardens; number of new community supported agriculture (CSA) gardens established.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
216	Integrated Pest Management Systems
503	Quality Maintenance in Storing and Marketing Food Products

Outcome #6

1. Outcome Measures

Agronomic, Fruit & Vegetable Crop Production: Number of producers attending programs, twilight tours and workshops; Number producers/growers developing basic diagnostic skills in identifying invasive insects, diseases and weeds; Number of producers who write and update their own nutrient management plan; Number of producers adopting production management practices that will improve their profitability; Number of producers who increase profitability; Number adopting field research practices dealing with improved crop varieties, invasive species, weeds and diseases; Number adopting methods to be more efficient in their water use in livestock and crop production.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Despite advances in organic weed management, organic growers consistently rank weeds as a primary production-related issues. Weeds continue to be a problem in non-competitive crops like vegetables, and as a result, farmers often rely on physical disturbances such as tillage to manage weed. These repeated soil disturbances negatively effects soil quality and health parameters. The competing interests for weed control and soil quality leave organic producers with few viable options for ecologically-based weed management. Organic herbicides are too expensive if use over an entire field.

What has been done
This research project, "The Influence of Cover Crops and Tillage on Soil Quality, Greenhouse Gas Emissions, Pest Community Dynamics, and Economics of Fields Transitioning to Organic Farming" has introduced an integrated weed management protocol that limits the tillage activity and significantly lowers the amount of organic herbicide needed while creating healthy soil conditions and crop yields.

Results

The adoption of minimum till practices will result in lower greenhouse gas emission and machinery input compared to conventional tillage practices with and without the use of black plastic mulches. Specific research goals include to: 1) examine the direct and indirect effects of cover cropping and reduced tillage on soil quality and soil health; 2) study how different tillage systems affect weed community dynamics; 3) determine how these practices affect net greenhouse gas emissions; 4) evaluate the cost effectiveness and profitability of reduced tillage practices; and 5) provide organic vegetable producers a comprehensive best management practice plan. These goals parallel ORG priorities of documenting and understanding the effects of organic practices on soil quality and greenhouse gas emission.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development
723	Hazards to Human Health and Safety

Outcome #7

1. Outcome Measures

Small/Beginning Farmers (Agronomic & Green Industry): Number of new farm enterprises established as a result of our programs; Number successfully completing Annie's Project; Number of women who have implemented change in their family farming operation after attending Annie's Project; Number of new/beginning farmers and Annie's Project graduates participating in additional UME AGNR programs, twilight tours and workshops; and number of farmers who become certified in nutrient management planning and/or pesticide safety.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
216	Integrated Pest Management Systems
311	Animal Diseases
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
608	Community Resource Planning and Development

Outcome #8

1. Outcome Measures

Research: Bovine Embryo Nutrient Utilization and Viability

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Despite decades of research, current in vitro embryo production protocols are not optimal as demonstrated by poorer embryo quality, aberrant embryo metabolism, and lower pregnancy rates. Early embryonic death and inadequate maternal recogniton of pregnancy are contributing factors to poor fertility in high producing dairy cows.

What has been done
Bovine embryos have been cultured under varying nutrient conditions and samples collected for analyzed by GC-Mass spectrometry. The preliminary results demonstrate that: 1) this approach is capable of measuring substrate use and metabolic pathway fluxes in as few as 4 embryos, and 2) that substrate balance in the media has a profound influence on pathway activities (e.g., glycolysis, PPP, PC, PDH, and ME), and on the routes and extents that media substrates are metabolized. Results were presented at a national meeting (SSR 2014).

Results
Unraveling the metabolic basis of normal early embryo development will provide significant benefits to human and animal reproductive health. Improved embryonic competency following in vitro production and cryopreservation would stimulate the industry by lowering costs, especially those related to recipient management.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals

Outcome #9

1. Outcome Measures

Research: Global Survey of Snail2 Target Genes During Avian Growth and Development

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The neural crest, a population of migratory cells derived from the future central nervous system in the developing chicken embryo, gives rise to a diverse range of cell types, including most of the peripheral nervous system, melanocytes, the craniofacial skeleton, and parts of the heart. As such, the proper formation of neural crest cells is critical for the overall growth and development of the chicken embryo into the adult organism.

What has been done

Research results to date show that aN-catenin works through Cadherin-7 to promote productive interactions with placode cells, while Annexin A6 may serve as a cytoskeletal scaffolding molecule and direct changes in actin to permit placode cell motility and associations with neural crest cells. In addition, researchers have discovered that the transmembrane tight junction protein claudin-1 influences neural crest cell emigration. Claudin-1 depletion or overexpression enhances or impedes neural crest cell emigration, respectively, and does this independently of affecting adherens junctions or the neural tube basal lamina.

Results

These results are the first to describe a role for Annexin proteins in the neural crest. Now being investigated is how Annexin A6 modulates neural crest cell cadherin levels. Researchers will next examine the temporal order of how these proteins are downregulated during neural crest cell EMT. Furthermore, we demonstrated that the Snail2 target aN-catenin is expressed later by migratory neural crest cells as they interact with placode cells to form the cranial trigeminal ganglia. Additional molecules expressed initially by neural crest cells were also investigated, including the Wnt target Annexin A6. The test results showed that this protein is lost by early migratory neural crest cells but is later expressed in placode cells during their induction, migration and interaction with neural crest cells during trigeminal ganglia assembly.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals

Outcome #10

1. Outcome Measures

Research: Deep Soil Nitrogen: A Resource for Profitability and Stewardship

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

While still in the early stages, the researchers are aiming to develop early establishment of cover crops in systems that prevent 200 kg/ha or more of N loss and return a significant part of that captured N in a time and form that the following cash crop can use, thus reducing the needed

fertilizer applications in spring.

What has been done

Research is underway to: measure size of deep N pool at end of soybean and corn season; evaluate the N capture ability of cover crops with early establishment (4-5 weeks before cash crop harvest), including aerial seeding; evaluate the utility of 1 or 2 irrigation passes immediately after aerial seeding in ensuring a vigorous early cover crop stand; test the validity of an on-the-spot nitrate-N analysis at seeding time using a new nitrate ion-selective electrode to predict the fall cover crop growth; 4) test the need for a small starter N application to allow cover crops to catch a larger amount of deep N; and evaluate the availability of the captured N (and S) to spring-planted cash crops.

Results

Preliminary data suggests that many cropped soils contain 100 to 400 kg mineral N/ha in the upper 2 meters. To capture this N before it leaches to the groundwater, cover crops must be established early enough in late summer/fall to root to 2 mters and produce significant biomass in fall. The on‐farm trials will generate important information on how to use cover crops for improved nutrient cycling and profitability

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
601	Economics of Agricultural Production and Farm Management

Outcome #11

1. Outcome Measures

Research: Development of Effective Vaccine Against Porcine Reproductive & Respiratory Syndrome Virus (PRRSV)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PRRSV has been causing enormous losses to the swine industry across the world since it was found in early 1990s. This current strategy and vaccines are inadequate to control PRRSV infection. The goals of this study are to explore a novel PRRSV strain that the research team discovered for vaccine development. The feature of this strain is induction of type I interferons, major component in innate immunity. PRRSV is known to inhibit interferon signaling. This strain is expected to enhance immune response and can be used as an improved vaccine against PRRSV.

What has been done
This strain has been attenuated in cultured cells by serial passaging in the laboratory. Its feature of interferon induction remains in the high passages of this strain. An animal experiment has been conducted to test the virulence and immunogenecity of the high passages. Virus neutralization and real-time PCR to analyse the pig serum samples is taking place.

Results
Completion of this project will generate a potential effective vaccine candidate against PRRSV. Further exploration of this strain will yield more information about its properties and application in vaccine development.

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases

Outcome #12

1. Outcome Measures

Research: The Environmental Concerns of Arsenic Additives in Poultry Litter

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
On May 22, 2012, then Maryland Governor Martin O'Malley signed a bill into law to ban the use of arsenic additives in poultry feed. This was the first such ban passed in the United States. This ban did not cover histostat which contains nitarsone and is used for treatment of blackhead

disease in poultry. On September 30, 2013 the USFDA announced that it was withdrawing approval of 3 of the 4 arsenic formulations used in animal feed including roxarsone, carbarsone and arsanilic. The USFDA is in the process of reviewing the fourth of these drugs, nitarsone.

What has been done

A literature review was conducted in response to a request by the Environmental Matters and the Education, Health and Environmental Affairs Committees of the Maryland General Assembly to help in their discussions on whether to ban the use of arsenic additives in poultry food. The goal of the review was to summarize the literature on the environmental consequences of adding arsenic to poultry food.

Results

Arsenic added to poultry feed as roxarsone ends up in poultry litter. Fresh litter contains predominately roxarsone while aged litter contains predominately inorganic arsenic. Soil arsenic concentrations from long-term poultry litter applications can exceed Maryland arsenic soil background remediation standards. Due to continued soil accumulation, arsenic amended litter use as fertilizer is thought to be unsustainable. Surface applied roxarsone amended litter does not influence deep aquifer arsenic concentrations but is transported as inorganic arsenic to receiving waters and very shallow groundwater after precipitation. Arsenic in some receiving waters and sediments from agriculturally dominated watersheds have levels above established criteria. Arsenic in fish and shellfish is mostly organic. Phosphorus based nutrient management will tend to limit PL application rates in areas that have over applied phosphorous relative to crop needs resulting in decreased rates of arsenic application and accumulation. Despite most arsenic in surface soils being tightly bound, as surface soils become more enriched in arsenic, the potential for downward movement increases but is limited in most soils due to the high capacity for binding of arsenic to clay minerals and oxides of iron and aluminum in subsoil horizons.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
723	Hazards to Human Health and Safety

Outcome #13

1. Outcome Measures

Research: Abiotic and Biotic Drivers of Productivity and Diversity in Worldwide Grasslands

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Working since inception (2007) with a global network of ecologists, dozens of parallel experiments have been set up in grassland ecosystems worldwide to tease apart the relative importance of climate, nutrient resources, and grazers in allowing plant species coexistence in grasslands.

What has been done
Using data from the global Nutrient Network, the researchers have challenged important ecological theory (the form of the productivity-diversity relationship) and provided evidence for mechanisms supporting other general theory (mechanisms of species coexistence). For example, the research has demonstrated that nutrient enrichment decreases grassland plant diversity, but herbivores increase diversity by reducing community dominance by the few and increasing light levels available to rare plants for photosynthesis and growth.

Results
The grassroots network, called the "Nutrient Network" (nutnet.org), has been more successful than ever anticipated. There are now 80+ research sites on 6 continents participating in the network.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems

Outcome #14

1. Outcome Measures

Research: Biological Invasions and Sustainability of Managed Ecosystems

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research has shown that conservation tillage doubles the prevalence of insect-pathogenic nematodes that provide endemic controls of potential pest insects.

What has been done
Research at MAES facilities has investigated the impact of tillage practices on soil biodiversity and biological control; treatment and control options for the invasive small hive beetle Aethina tumida; and microbial and community ecology of introduced woodwasp Sirex noctilio.

Results
Work with Sirex noctilio has provided evidence fundamentally changing the understanding of its biology: the first evidence has been obtained of a tripartite symbiosis with fungal and bacterial mutualists for the larvae as they burrow through the xylem of pine trees. The fungus provides simple carbohydrates from cellulose and lignin, which then powers the energy-intensive process of internal microbial nitrogen fixation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
216	Integrated Pest Management Systems

Outcome #15

1. Outcome Measures

Research: The Influence of Cover Crops and Tillage on Soil Quality, Greenhouse Gas Emissions, Pest Community Dynamics, and Economics of Transitioning to Organic Farming

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Frequent soil disturbances resulting from production activities such as tillage or cultivation for land preparation or weed management can be detrimental to soil quality by negatively impacting physical, chemical, and biological soil properties. Cover cropping, in combination with reduced tillage, can reverse these negative effects and concurrently reduce insect and weed pests, production costs, and CO2 emissions, while providing additional ecosystem services such as increasing nutrient-cycling organisms and soil biodiversity.

What has been done
The research is 1) examining the direct and indirect effects of cover cropping and reduced tillage on soil quality and soil health; 2) studying how different tillage systems affect weed community dynamics; 3) determining how these practices affect net greenhouse gas emissions; 4) evaluating the cost effectiveness and profitability of reduced tillage practices; and 5) providing organic vegetable producers a comprehensive best management practice plan.

Results
Thus, through this research, an integrated weed management protocol has been producted that limits the tillage activity and significantly lowers the amount of organic herbicide needed while creating healthy soil conditions and crop yields. Vegetable growers can get similar yields using minimal till compared to conventional till practices while reducing fuel use, production cost and green house gas emission. Minimal till practices such as no-till and strip-till when integrated with cover crops can be use as a legitimate practice for managing weeds that reduce the amount of chemical inputs required for managing pests. The strip-till treatment may still require herbicide use as part of an overall Integrated Weed Management plan but the total amount applied can be reduced by as much as 75% compared to spraying the entire field.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
216	Integrated Pest Management Systems

Outcome #16

1. Outcome Measures

Research: Surface Properties, Transport, and Delivery of Protein-based Nanoparticles: Using Cationic β-lactoglobulin Nanoparticles as a Model System.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The interplay among the drug, matrix, and environment plays a critical role in the behavior of drug-loaded nanoparticles in various physiological processes, all of which determine their stability and performance after oral administration.

What has been done
This research introduced a novel drug delivery system based on cationic-lactoglobulin (CBLG), which demonstrated satisfactory stability against digestion, high mucoadhesion, effective transport across the small intestine lining, low cytotoxicity, and elevated cellular uptake.

Results
Using native BLG and two CBLGs bearing different cationic groups in the form of either molecules or nanoparticles, the research demonstrated how the chemical composition influenced the surface charge, hydrophobicity, and particle size of biopolymer-based drug carriers. The research revealed the complexity of the transport and delivery of oral-administrated drugs, in that a specific property (e.g., small size) might benefit the performance of the drug carrier in some biological procedures while lower their efficacy in other processes. Results suggested that CBLGs absorbed on the negatively charged serum proteins in the cell culturing medium, which altered their properties and behavior of the former. This research not only provided an attractive drug delivery vehicle but also shed some light on the fate of nano-sized drug carriers with well-defined surface structure.

4. Associated Knowledge Areas

KA Code	Knowledge Area
704	Nutrition and Hunger in the Population
723	Hazards to Human Health and Safety

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Urban sprawl and State Budgets)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Annie's Proect participants leave the program with a high intent to write business and marketing plans, use computers, check credit reports, prepare financial statement, update estate plans, and positively increase community and family relations. Writing business and marketing plans was an action that participants wanted to do (97%) and 42% actually followed through. Checking credit reports, updating estate plans, and positively increasing family communications were the actions that the greatest majority of participants engaged in. A medium-term outcome of Annie's Project is to help ensure the economic viability of farming operations. Data obtained from the participants indicate that the program is successful in this regard. When asked if Annie's Project has increased their profitability 43% responded that yes it has. A range of dollar increases were then available for selection. The average Annie's project participant since 2008 has increased farm profitability between $2165.31 and $3780.84 with the average participant increasing farm profitability by $3,123.96

Key Items of Evaluation

In 2014 two hundred individuals utilized the AGsploration curriculum in 26 states and territories. In Maryland ninety-two AGsploration lessons were taught to 6,192 program participants and 7 trainings were held to certify 168 new curriculum teachers. On pre/post tests of students all indicated gaining more knowledge in the topics covered on agriculture and one in four participants indicated wanting to purse a degree or occupation in agriculture science. 82% of trained teachers on a followup survey indicated the program improved their ability to teach about agriculture. 55% reported and increase in their attitudes towards using agriculture to teach STEM. 36% indicated an improvement in their students' knowledge of agriculture and their ability to understand the benefits of agriculture. Therefore the AGsploration program has increased the knowledge and appreciation of agriculture in Maryland and created a network of trained individuals to more effectively continue the educational cycle.
In September of 2012, UME launched the Beginning Farmer Success project. The Maryland

Collaborative for Beginning Farmer Success builds on existing Extension resources and partnerships with Future Harvest-CASA and Southern MD Agriculture Development Commission, regional nonprofits, agricultural organizations, and experienced farmers to provide beginning farmers with easily accessible tools and practical experience-based training on farm production, marketing, land management, business planning, and financial resources. A follow-up survey with these beginning farmers indicated that as a result of this project, participants increased business knowledge by 74% and crop knowledge by 88%. Participants were asked if they would take action as a result of the program. 82% plan to implement business actions and 92% plan to implement crop actions. Organic grain producers that receive on-going education from UME indicated that they plan to implement the following: 8.82% improved pest management practices, 35.29% improved fertility management, 30.88% improved crop production practices, 4.41% use of risk management methods, 2.94% regulatory information, and 17.65% a new product or practice. Producers have increased profitability by $29.62 per acre on 553.45 acres per producer. The average producer increased farm profitably by $16,393.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Climate Change

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	10%	10%	15%	57%
111	Conservation and Efficient Use of Water	10%	10%	5%	0%
112	Watershed Protection and Management	15%	20%	10%	15%
123	Management and Sustainability of Forest Resources	5%	5%	5%	0%
131	Alternative Uses of Land	10%	5%	5%	0%
132	Weather and Climate	0%	0%	0%	10%
133	Pollution Prevention and Mitigation	10%	10%	25%	18%
205	Plant Management Systems	15%	10%	10%	0%
216	Integrated Pest Management Systems	10%	10%	10%	0%
403	Waste Disposal, Recycling, and Reuse	5%	10%	15%	0%
608	Community Resource Planning and Development	10%	10%	0%	0%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	16.0	3.0	11.0	2.5
Actual Paid	16.0	0.0	11.0	6.5
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
341273	135656	374864	325071
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
341273	135656	374864	502584
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
292204	0	21588	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

• UME, MAES, and AES will have a combined focus to help producers plan and make decisions in adapting to changing environments, sustaining economic vitality, and taking advantage of emerging economic opportunities offered by climate change mitigation technologies.
• UME, MAES, and AES will also develop research and education programs that generate knowledge to develop agriculture systems that maintain high productivity in the face of climate changes and reduce greenhouse gas emissions.
• In an effort to meet these objectives, UME, MAES, and AES will develop research and action teams that will focus on: Alternative energy and biofuels; Aquatic resources; Biodiversity/ecosystem services; Energy conservation; Forest resources; Integrated Pest Management; Invasive and exotic species; Land use; Nutrient management; Recreational resources; Waste management; Waste utilization and resource recovery; Watershed restoration; and Wildlife resources.
• UME, MAES, and AES will conduct workshops, demonstrations, symposia, twilight tours, forums and research to educate producers, farmers and citizens about adapting management practices to benefit the environment and minimize climate change impacts.
• MAES, AES, and UME will develop and expand collaborative research and education programs with partners and stakeholder and develop new web based and media educational materials.

2. Brief description of the target audience

- Maryland citizens;
- Master Gardeners and Naturalists;
- Land developer and owners;
- UME, MAES, and AES faculty;
- USDA-NRCS conservationists;
- Soil Conservation District personnel;
- MDA program staff;
- MDE program staff;
- Producers;
- Farmers;
- Nursery and Greenhouse industry personnel;

- Forest landowners;
- 4-H youth;
- County planning and zoning program staff;
- AGNR industry;
- Nonprofits;
- Appropriate state and municipal government officials;
- Primary and Secondary Science Teachers;
- Media; and
- Maryland homeowners.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	45784	192562	6991	0

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	17	40	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Nutrient Management Planning, Waste Management Systems, Composting and Water Resources (Agronomic, Livestock & Green Industry): Short courses; Workshops; Twilight tours;

Field days; Seminars; In-service training; Grants; Publications; and Websites.

Year	Actual
2014	51

Output #2

Output Measure

- Chesapeake Bay, Water Resources, Nutrient Management and Composting (Residential): Water Resources-Short courses; In-service training; Volunteers trained; and New relationships, policy & technology developed.

Year	Actual
2014	148

Output #3

Output Measure

- Management and Sustainability of Forest/Wildlife Resources (Forest landowners, Forest Industry and Loggers): Publications; Workshops; Distance Education Courses; Field trials; Demonstrations; Grants; and Web sites.

Year	Actual
2014	25

Output #4

Output Measure

- Alternative Crop Production: Workshops; Seminars; In-Service training programs; Variety trials; Field days; Twilight tours; Publications; Grants; and Participants in alternative/ethnic crop production programs.
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Nursery & Greenhouse Crop Production: Workshops; Seminars; Twilight tours; Field days; Grants; In-service training programs; Web sites; Publications; and Producers attending educational programs.
  Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Pesticide Safety Education: Workshops; Seminars; Demonstrations; Grants; Web sites; Publications; and Participants in educational/certification programs.

Year	Actual
2014	580

Output #7

Output Measure

- New Technologies-Using High Tunnels to Remain Competitive in a Global Market: Workshops; Field trials; Demonstrations; Twilight tours; Grants; Publications; and Participants in educational programs.

Year	Actual
2014	8

Output #8

Output Measure

- Master Gardener Program: Workshops; Seminars; Advanced training; Grants; Publications; and Participants in educational programs.

Year	Actual
2014	341

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Nutrient Management Planning, Waste Management Systems, Composting and Water Resources (Agronomic, Livestock & Green Industry): Number of producers implementing nutrient management plans; plans written; Producers relate nutrient management to water quality; Producers trained in plan writing; Policy makers and farmers understand the scientific issues of land applied poultry litter and poultry stockpiles; Producers using compost technology.
2	Chesapeake Bay, Water Resources, Nutrient Management and Composting (Residential): Adoption of composting; Water wells tested; Septic tanks improved; Number of citizens adopting practices of landscape ecology and understanding the relationship among pesticides, poor septic systems and environmental health.
3	Management and Sustainability of Forest/Wildlife Resources (Forest Landowners, Forest Industry & Loggers): Number of forest landowners and loggers gain knowledge of forest stewardship and practices; Understand wildlife damage control measures; Forest Stewardship Plans implemented; and Master loggers trained.
4	Alternative Crop Production: Number of farmers growing new alternative crops; New farm enterprises; Farm markets selling new alternative crops and/or value added crops; and New varieties researched.
5	Nursery & Greenhouse Crop Production: Number of IPM scouts and producers that can identify threshold pest levels; Research based recommendations implemented, such as efficiency of water use and energy; Certification in pesticide safety; Field trials developed; Nutrient management plans developed; Growers that adopt sustainable practices that will improve crops with reduced losses; Growers implementing sustainable practices that reduce losses and reduce environmental impacts; and New crop varieties planted based on UME/MAES research.
6	Pesticide Safety Education (Agronomic & Green Industry): AGNR producers/farmers/applicators that are certified in pesticide safety; Pesticide safety practices implemented such as wearing a respirator, gloves and showering after application; Increase in knowledge of IPM techniques.
7	New Technologies in a Global Market: New high tunnels established; Producers who have implemented research based practices; New varieties established; Applied research- variety trials; Producers who have increased profitability as a result of installing high tunnels; Request for workshops, seminars and twilight tours; Producers who participate in USDA's high tunnel cost share program; and Cooperators in on-farm research projects.
8	Environmental Stewardship: Master Gardeners programs developed and delivered by MGs; Plant Clinics held; and MGs who participate in MD Master Naturalist Program.
9	Research: Responses of Coastal Ecosystems to Rapid Environmental Change

Outcome #1

1. Outcome Measures

Nutrient Management Planning, Waste Management Systems, Composting and Water Resources (Agronomic, Livestock & Green Industry): Number of producers implementing nutrient management plans; plans written; Producers relate nutrient management to water quality; Producers trained in plan writing; Policy makers and farmers understand the scientific issues of land applied poultry litter and poultry stockpiles; Producers using compost technology.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Maryland Water Quality Improvement Act requires Maryland farmers as well as green industry businesses to develop and follow nutrient management plans that are approved by the State of Maryland. The guiding principle behind nutrient management planning and implementation, as outlined in the Maryland Water Quality Improvement Act of 1998, is that nutrients applied in any form
should balance with plants' nutrient needs.

What has been done
UME Nutrient Management Advisors prepared nutrient management plans for 40 Manure Transport Project clients, developed or updated plans to partially fulfill permit requirements for 68 CAFO or MAFO clients, conducted the Phosphorus Site Index for 213 clients on 1,384 fields, and wrote 324 plans for 178 Maryland producers for more than 10,000 acres. The nutrient management advisors' updated 5,605 plans for 1,200 clients for approximately 250,000 acres.

Results
The nutrient management programs continue to conduct research on nutrient utilization in agronomic and horticultural crop production and animal nutrition, as well as educate the public on fertilizer management and sustainable horticultural practices. These research and education efforts allowed the nutrient management initiatives to continue achieving their goal of improving

and protecting the health of the Chesapeake Bay and Maryland's tidal and nontidal waterways while maximizing the state's economic potential.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
132	Weather and Climate
133	Pollution Prevention and Mitigation
403	Waste Disposal, Recycling, and Reuse

Outcome #2

1. Outcome Measures

Chesapeake Bay, Water Resources, Nutrient Management and Composting (Residential): Adoption of composting; Water wells tested; Septic tanks improved; Number of citizens adopting practices of landscape ecology and understanding the relationship among pesticides, poor septic systems and environmental health.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Urban stormwater runoff is the source for 22% of phosphorus, 18% of nitrogen and 51% of sediment load for Maryland?s annual load contributions into the Chesapeake Bay (MDE 2012). Urban stormwater is the one sector of the total maximum daily load (TMDL) that continues to see increasing loads as more forest and agricultural lands are converted to residential and other developed uses. The Bay TMDL requires all counties to quantify and reduce those pollutant loads from urban stormwater in their watershed implementation plans (WIPs).

What has been done
A myriad of programs have been designed to address these issues: Bay-Wise & Watershed Stewards Academy, Stormwater Mamanagement and Restoration Tracker (SMART), and the new Chesapeake Bay Landscape Contractor Certification Program (CBLP). SMART is an interactive, web-based mapping, tracking and reporting tool that provides a credible and certifiable way to account for 15 small-scale practices that can be implemented by property owners. The tool allows individuals to upload their BMP data to a local website, where the data are tracked, checked and certified by trained volunteers.

Results
According to the UMCES report card, water quality has improved in the Potomac River from a D+ in 2012 to a C- in 2013. A Watershed Stewards Academy (WSA) for the Eastern Shore, started in 2012, uses a train-the-trainer approach to target community members who provide stormater education and assist with the stormwater BMPs to help Maryland meets its load allocation targets by 2025.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
608	Community Resource Planning and Development

Outcome #3

1. Outcome Measures

Management and Sustainability of Forest/Wildlife Resources (Forest Landowners, Forest Industry & Loggers): Number of forest landowners and loggers gain knowledge of forest stewardship and practices; Understand wildlife damage control measures; Forest Stewardship Plans implemented; and Master loggers trained.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual

2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In many Maryland waters and in the Chesapeake Bay, a challenge is to improve water quality and maintain viable natural resources. Forestland is a critical component towards meeting this challenge as it functions as a buffer, reducing the nutrients and sediment entering waterways which adversely affect water quality, aquatic organisms, fisheries, and human health. A healthy forest directly impacts water quality and is a benefit to all Maryland citizens.

What has been done
The Maryland Woodland Stewards Project is an educational program of UME. It teaches forest and wildlife management practices and leadership skills to participants who apply these principles to property they own or manage, and actively encourage others to practice good forest stewardship using the principle of Neighbor Helping Neighbor.

Results
Since 1990, 454 individuals with a total ownership of 69,040 acres have been trained as Woodland Stewards and have developed and implemented a forest stewardship plan, provided outreach to friends, neighbors, and others, and have become advocates in their communities. Through this education, informed decisions about forest acreage has increased, resulting in better water quality and a healthy eco-environment.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
205	Plant Management Systems
608	Community Resource Planning and Development

<u>Outcome #4</u>

1. Outcome Measures

Alternative Crop Production: Number of farmers growing new alternative crops; New farm enterprises; Farm markets selling new alternative crops and/or value added crops; and New varieties researched.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
For Maryland, as with the nation, there are needs to: (1) provide mentoring education to beginning farmers to ensure their success; (2) ensure that those interested in farming, but do not have access to land or other resources, are linked to landowners with land to lease or sell and sources of resources; and (3) develop mechanisms to promote new farmers in the midst of an aging farm operator population and shortage of qualified operators to replace them

What has been done
The Maryland Collaborative for Beginning Farmer Success builds on existing Extension resources and partnerships with Future Harvest-CASA and Southern MD Agriculture Development Commission, regional nonprofits, agricultural organizations, and experienced farmers to provide beginning farmers with easily accessible tools and practical experience-based training on farm production, marketing, land management, business planning, and financial resources. The program reached 1,243 beginning farmers and had approximately 11,000 web site visits for information.

Results
As a result of this project, participants increased business knowledge by 74% and crop knowledge by 88%. Participants were then asked if they would take action as a result of the program--82% plan to implement business actions and 92% plan to implement crop actions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
132	Weather and Climate
205	Plant Management Systems
216	Integrated Pest Management Systems
608	Community Resource Planning and Development

<u>Outcome #5</u>

1. Outcome Measures

Nursery & Greenhouse Crop Production: Number of IPM scouts and producers that can identify threshold pest levels; Research based recommendations implemented, such as efficiency of water use and energy; Certification in pesticide safety; Field trials developed; Nutrient management plans developed; Growers that adopt sustainable practices that will improve crops with reduced losses; Growers implementing sustainable practices that reduce losses and reduce environmental impacts;

and New crop varieties planted based on UME/MAES research.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Agriculture is the greatest consumptive user of water in the US, and in many regions agricultural water use cannot be sustained. Irrigation accounts for 62% of freshwater (surface and ground water) use in the United States. More than 55.4 million acres of land were irrigated in the United States in 2013, of which 72% were irrigated by sprinkler and micro-irrigation systems. Water moves fertilizer through the soil, so irrigation management is a key part of nutrient management.

What has been done
Better tools are needed to assist farmers to use irrigation water as efficiently as possible. With funding from the USDA Specialty Crops Research Initiative (SCRI) the SCRI-MINDS project has developed advanced wireless sensor control technology and software to apply irrigation water based on daily plant requirements.

Results
The SCRI-MINDS project has demonstrated that wireless sensor network control systems can provide specialty crop producers with real-time soil moisture and environmental conditions of the farm via smartphone and that a reduction of between 40-70% in irrigation water applications can be achieved.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
132	Weather and Climate
133	Pollution Prevention and Mitigation

205	Plant Management Systems
216	Integrated Pest Management Systems
403	Waste Disposal, Recycling, and Reuse
608	Community Resource Planning and Development

Outcome #6

1. Outcome Measures

Pesticide Safety Education (Agronomic & Green Industry): AGNR producers/farmers/applicators that are certified in pesticide safety; Pesticide safety practices implemented such as wearing a respirator, gloves and showering after application; Increase in knowledge of IPM techniques.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There is growing market demand for greenhouse and nursery plants grown either without use of pesticides that potentially damage pollinators and using low risk pesticides that improve worker and public safety.

What has been done
UME developed the "Biological Control for Greenhouses and Nurseries" program to teach growers about alternative methods, including biological control, use of low-risk pesticides, and use of organic fertilizer sources.

Results
Two Maryland greenhouse operations started using entomopathogenic nematodes for thrips and fungus gnat control. Three greenhouse operations reported that since the conference they started using Rootshield application on their poinsettia crops. Program participants indicate they plan to use Trichodemerma, Soilguard, Baccilus subtilis (Cease) Bromine water treatment, Milistop, or biological control for disease control on one on more crops in the coming year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation
205	Plant Management Systems
216	Integrated Pest Management Systems
403	Waste Disposal, Recycling, and Reuse

Outcome #7

1. Outcome Measures

New Technologies in a Global Market: New high tunnels established; Producers who have implemented research based practices; New varieties established; Applied research- variety trials; Producers who have increased profitability as a result of installing high tunnels; Request for workshops, seminars and twilight tours; Producers who participate in USDA's high tunnel cost share program; and Cooperators in on-farm research projects.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The planting of vineyards is one of the most rapidly expanding agricultural ventures in Maryland. With this rapid expansion comes a concomitant increase in demand for information on site evaluation, establishment, and maintenance details. There will be high demand for this information and services as most of the new growers do not have practical agricultural backgrounds. They will therefore be looking for regional research based information to help them to make the proper decisions for all of the inputs into the project.

What has been done
Conducted Beginners Grape Grower Workshops. Conducted on-farm field days and programs to demonstrate procedures and techniques. Conducted site visits with local Extension educators to evaluate sites when possible. Conducted applied regional research on varieties, canopy management and training systems, and enological techniques.

Results
Growers gain knowledge and confidence necessary to make accurate evaluation of suitability of sites and proper decisions on establishment and variety choice leading ultimately to efficient and successful establishment of new productive and profitable vineyards.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
205	Plant Management Systems
216	Integrated Pest Management Systems
608	Community Resource Planning and Development

Outcome #8

1. Outcome Measures

Environmental Stewardship: Master Gardeners programs developed and delivered by MGs; Plant Clinics held; and MGs who participate in MD Master Naturalist Program.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Reducing pesticide use in home, school, and community gardens is especially critical because of the risk of ingesting pesticide residues on vegetables and fruits. Master Gardeners are volunteer outreach educators, trained and managed by Extension professionals. They influence the garden, landscape, and pest management decisions of tens of thousands of residents each year. Master Gardeners who understand and adopt these practices are more likely to teach them to the public.

What has been done

Six Master Gardener basic training classes in sustainable vegetable production and IPM, sustainable fruit production and IPM, soils, composts, and fertilizers, and plan diagnostics and pesticide safety have been provided. Vegetable plant and pest diagnostic classes were taught to 72 Master Gardeners, mostly using in-field and hands-on techniques.

Results
As a result of the vegetable and fruit IPM training given to Master Gardeners, Maryland home gardeners reduced chemical pesticide use, thus saving money and reducing environmental damage and health risks.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
133	Pollution Prevention and Mitigation
205	Plant Management Systems
216	Integrated Pest Management Systems
403	Waste Disposal, Recycling, and Reuse

Outcome #9

1. Outcome Measures

Research: Responses of Coastal Ecosystems to Rapid Environmental Change

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In a collaboration with the Smithsonian Environmental Research Center and supported by NSF and NASA grants, MAES research is documenting the poleward expansion of mangrove ecosystems into temperate saltmarsh driven by climate change.

What has been done
This research is documenting the regional and global extent of mangrove expansion with climate change, testing alternative mechanisms for this phenomenon, and seeking to understand biodiversity and ecosystem-level consequences of this coastal change.

Results
Using remote sensing, research showed clear evidence that mangrove expansion on Florida?s eastern coast is linked with a decreased frequency of severe freeze events over the past 30 years. Follow-up work linked plant physiology with these broad scale patterns and then projected mangrove areal range under climate change scenarios to 2060. Current work is analyzing the role of insect pollinators and herbivores in the mangrove expansion, and also the consequences for settlement of crabs in the marine environment

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
132	Weather and Climate

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)
- Other (funding)

Brief Explanation

UME is still limited in climate change expertise and is working to develop that expertise among educators, specialists, and researchers.

The limitation for research has always been shortage of funds. Our faculty achieved excellent research findings in the area of climate variability and land use impacts on our water resources and the environment despite limited funds. Again, UME, MAES, and UMES need more positions and expertise in this area, which requires additional resources.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Not reporting

Key Items of Evaluation

Not reporting

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Family & Consumer Sciences

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
504	Home and Commercial Food Service	10%	100%	100%	0%
703	Nutrition Education and Behavior	30%	0%	0%	0%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%	0%	0%	0%
724	Healthy Lifestyle	30%	0%	0%	0%
801	Individual and Family Resource Management	20%	0%	0%	0%
	Total	100%	100%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	20.0	3.5	13.0	0.0
Actual Paid	20.0	0.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
511910	203484	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
511910	203484	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
438305	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. The realities of living in poverty, living paycheck to paycheck without an emergency fund, not knowing where the next meal is coming from, not owning assets, accessing subprime credit, being behind on payments, not having health insurance, being unbanked or under-banked, and filing bankruptcy are higher for single women, for Marylanders of color, and for single parents. Children themselves are aware of the difficulties their own families and their neighbors are facing and are sincerely interested in learning about money management. Young people report that they currently care more about financial fitness than physical fitness. 64% say that financial fitness is more important than physical fitness, and 51% believe that financial education in grades K-12 is more important as compared to physical education (31%) or sex education (18%).

2. Health literate people understand health information and have the skills to use that information in making health decisions and accessing health services. The ability to access and process information and services is affected by the demands of health education and service environments. Demand is influenced by the practice of professionals whose work is in public health. Unfortunately, the majority of American adults regularly have difficulty understanding basic health information--including instructions, insurance, consent forms, even health signage. A national study found that only 12% of the population is fully proficient. And at any given time, depending on circumstances, even those adults may not be able to understand and act accordingly due to emotional, mental, or physical state of health.

3. Vulnerable populations such as children, the elderly, and minority populations are disproportionally affected by environmental health hazards. One of the highest risks for exposure to these hazards is in the home, due to the time spent there- particularly by children and the elderly, as well as workplaces and schools. Environmental health hazards negatively impact the health and economic well-being of the individual and family as well as society. The home environment includes suburban, urban, and rural homes as well as the effects of the surrounding community -neighborhood, farm, watershed, and ambient air quality.

4. According to the CDC Injuries are the leading cause of death and disabilities for people ages 1-34 years in the U.S. Injuries can be prevented by changing the environment, individual behavior, social norms, legislation, and governmental and institutional policies. The 2013 Maryland's Advocates for Children and Youth goals recommend programs and policies to keep children and youth safe and healthy in their homes, schools and communities to foster opportunities for positive development. Adults and children must understand the ramifications that a lack of understanding/knowledge of how substances such as household and farm chemicals; drugs, alcohol and tobacco can cause illnesses and even death. Approximately 38,000 poisonings and over doses are reported to the Maryland Poison Control Center every year. In 2010, some 8.1 % of the poisonings and over dose calls to the MPC involved a drug, while 50.0% of the calls involved a non-drug substance.

5. The UME 2014-2019 Strategic Plan Steering Committee released an environmental scan for emerging trends of Marylanders. One of the key findings is that as we move forward, the breaking down of internal and external silos and the exploring new partnerships will be necessary to create a sustainable structure. This includes joining and/or facilitating new organizations or coalitions with traditional and non-traditional partners, working together to develop and deliver programming, as well as secure funding to deliver health programs.

Further, this work is to occur both within and outside the university structure. While much of the work exists in the community and efforts should be largely focused in this arena, it is at times necessary and beneficial to engage with colleagues both within and outside Extension. This includes exploring potential partnerships in AGNR, the School of Public Health and others that can contribute to the mission and goals of the Health Smart Team.

2. Brief description of the target audience

- Extension Educators
- People who need to purchase health insurance
- Professionals/Practitioners
- Childcare providers
- Youth/4-H
- Families with specific health hazards
- Older adults
- Military families
- General audiences
- Athletes, coaches, medical professionals
- University-wide faculty
- Community Partners
- Federal/State Partners
- Professionals/Practitioners

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	79376	1221055	7936	2050

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	3	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Factsheets & publications, curricula, meeting with partners, in-services, workshops
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of Educational Workshops Offered

Year	Actual
2014	2598

Output #3

Output Measure

- Numbers of Adults and Youth with Increased Financial Literacy

Year	Actual
2014	1428

Output #4

Output Measure

- Number of Adults and Youth with Increased Health Literacy

Year	Actual
2014	640

Output #5

Output Measure

- Number of Adults and Youth With Increased Understanding of Healthy and Safe Home Environments

Year	Actual
2014	1492

Output #6

Output Measure

- Numbers of Youth and Adults with Increased Nutrition/Healthy Eating Understanding

Year	Actual
2014	63403

Output #7

Output Measure

- Number of Applied Research Projects
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Nutrition: The number of individuals who demonstrate adoption of healthy eating practices based on the My Plate Dietary Guidelines for Americans, including the number who adopt or plan to: Choose a variety of colors of fruits and vegetables; choose high fiber foods; choose lower fat dairy products; choose smaller portions of foods; choose whole grain foods; read food labels before making purchase; make foods at home instead of buying convenience foods; plan meals before shopping at grocery store.
2	Food Safety: The number of individuals that indicate change in behavior related to good personal hygiene including hand washing, cooking foods adequately, avoiding cross contamination, keeping foods at safe temperature
3	Volunteer Development: The number of UME trained 4-H volunteers who provide leadership and guidance for 4-H youth development programs.
4	4-H Clubs: The number of 4-H club leaders and volunteers who demonstrate an application of the essential elements of youth development and model experiential learning.
5	Youth Outreach: Teen and adult volunteers in after school and military partnership programs and youth enrolled.
6	Healthy Living: Read labels before using hazardous household chemicals; Identify potentially hazardous products that affect indoor quality; take steps to control humidity in homes; use safe practices with household products to improve indoor air quality. Health Literacy: increased awareness of how to access research-based health information; understand connection between health literacy and financial literacy.
7	Financial Literacy Education: An increase in basic financial literacy; An increase in ability to make both short- and long-term decisions regarding credit, debt, estate planning, spending and saving.
8	Increase in Children and Youth Who Report Eating More Healthy Foods
9	Individuals Who Report Increased Ability to Set Financial Goals, Make Savings Plans, Establish Emergency Funds, and Decrease Debt
10	Increase in People Reporting the Adoption of Healthy Home Practices
11	Increase in Reported Confidence and Capability to Make Smart Health Insurance Decisions.
12	Increased Research Findings that Contribute to Individuals and Families Well-being and Quality of Life

Outcome #1

1. Outcome Measures

Nutrition: The number of individuals who demonstrate adoption of healthy eating practices based on the My Plate Dietary Guidelines for Americans, including the number who adopt or plan to: Choose a variety of colors of fruits and vegetables; choose high fiber foods; choose lower fat dairy products; choose smaller portions of foods; choose whole grain foods; read food labels before making purchase; make foods at home instead of buying convenience foods; plan meals before shopping at grocery store.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
While farmers markets are great places to buy local, healthy foods, markets could improve outreach and promotion efforts to increase patronage and federal nutrition program benefit redemption, including Supplemental Nutrition Assistance (SNAP). However, many SNAP recipients, and the general population, are unfamiliar with many healthy local fresh fruits and vegetables, including the nutritional benefits and how to prepare them. Farmers' markets provide an opportunity to influence market visitor knowledge and purchasing, preparation and consumption of fruits and vegetables through education and sampling of prepared simple and healthy recipes.

What has been done
Through the University of Maryland Extension (UME) Food Supplement Nutrition Education (FSNE) program, more than 9,400 individuals and 91 Market to Mealtime educational/demonstration events were conducted by UME and FSNE educators.

Results
Sixty three percent of Market to Mealtime participants take home more fruits and vegetables than they typically do after Market to Mealtime education. Nine out of ten planned to buy or choose the fruit or vegetable they learned about that day and use it in meals and snacks during the week; half took home a new fruit or vegetable they never had before. Because of increased consumption of fruits and vegetables, these individuals are less likely to suffer from chronic

diseases and experience financial hardships because of health care costs associated with chronic disease management.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle
801	Individual and Family Resource Management

Outcome #2

1. Outcome Measures

Food Safety: The number of individuals that indicate change in behavior related to good personal hygiene including hand washing, cooking foods adequately, avoiding cross contamination, keeping foods at safe temperature

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Although the food supply in the United States is among the safest in the world, food-borne illness contributes to many cases of sickness and death each year. The Centers for Disease Control (CDC) & Prevention estimates that 48 million people get sick, over 128,000 are hospitalized, and at least 3,000 people die each year from foodborne illness caused by contaminated foods.

What has been done
Understanding safe food preservation techniques and an appreciation of the food science behind the process can prevent unnecessary food-borne illnesses (especially Clostridium botulinum, or botulism) from occurring. FCS Educators teach, "Grow It, Eat It, Preserve It" to Marylanders to help them understand how to safely preserve foods using water-bath and pressure canning.

Results

The evaluation results from the food preservation classes show it is an effective means to assist the community to safely preserve foods and prevent botulism. All participants expressed confidence in performing water bath canning and 98% of the participants felt confident about pressure canning. By obtaining these skills and confidence, the incidences of botulism will be reduced and health and well-being increased.

4. Associated Knowledge Areas

KA Code	Knowledge Area
504	Home and Commercial Food Service
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
724	Healthy Lifestyle
801	Individual and Family Resource Management

Outcome #3

1. Outcome Measures

Volunteer Development: The number of UME trained 4-H volunteers who provide leadership and guidance for 4-H youth development programs.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

4-H Clubs: The number of 4-H club leaders and volunteers who demonstrate an application of the essential elements of youth development and model experiential learning.

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Youth Outreach: Teen and adult volunteers in after school and military partnership programs and youth enrolled.

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Healthy Living: Read labels before using hazardous household chemicals; Identify potentially hazardous products that affect indoor quality; take steps to control humidity in homes; use safe practices with household products to improve indoor air quality. Health Literacy: increased awareness of how to access research-based health information; understand connection between

health literacy and financial literacy.

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Financial Literacy Education: An increase in basic financial literacy; An increase in ability to make both short- and long-term decisions regarding credit, debt, estate planning, spending and saving.

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

Increase in Children and Youth Who Report Eating More Healthy Foods

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Recent studies have found that lifestyle choices and physical activity practices are established very early in life and have an impact on future health and well-being. Thus, preschool-age is a critical time for nutrition education intervention.

What has been done
Preschool-aged children were reached through nutrition and gardening focused curricula, including Color Me Healthy; Read for Health; and Grow It, Try It, Like It. School-aged youth received nutrition education through five primary nutrition-focused curricula, including Nutrition Nuggets, Read for Health, ReFresh, Media Smart Youth, and Up for the Challenge. These nutrition education programs encourage healthy eating and physical activity through multiple interventions, including music, dance, children's books, fruit and vegetable tastings, and gardening/planting activities.

Results
In FY14, FSNE reached more than 33,100 low-income participants and made over 256,000 contacts with those participants over series of nutrition education classes. FSNE educators in 17 counties and Baltimore City spent almost 9,250 hours delivering nutrition education to individuals throughout the lifespan: preschool-aged youth (21% of total participants), school-aged youth (55%), adults (22%), and seniors (2%). FSNE educators also trained approximately 1,200 collaborating partners to administer lessons from 17 different nutrition education programs to the target audience. In FY14, trained trainers/collaborating partners alone provided education to almost 40% (12,779 individuals) of the total participants reached by FSNE. Youth who participate in FSNE programs report higher preferences for healthy foods and a greater consumption of fruits and vegetables after program participation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #9

1. Outcome Measures

Individuals Who Report Increased Ability to Set Financial Goals, Make Savings Plans, Establish Emergency Funds, and Decrease Debt

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Programs for dropout youth and juveniles in detention facilities, especially those in Baltimore City, need help to enable youth make better decisions, acquire General Education Development (GED), make appropriate career choices, and better decisions with money management once acquired a job.

What has been done
Yo! Baltimore program is a juvenile decision making, career choice, and financial management program that teaches middle and high school dropout youth in GED programs and juveniles in

detention how to make better decisions while preparing for GED, exploring suitable careers by evaluating career choices after obtaining GED, and also, to apply the same learned concepts in making better decisions with their income earned. Students use Microsoft Excel to learn basic budgeting and cost analysis based on financial decision-making.

Results

Evaluation results from Yo! Baltimore indicate that students increased knowledge and skills about choosing a career and managing income earned. Students gained confidence in making decisions that would enable them to complete their GED and develop skills required for an appropriate career choice. With these enhanced skills, these youth have increased their chances of becoming financially responsible adults that can support themselves and enhance their quality of life.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #10

1. Outcome Measures

Increase in People Reporting the Adoption of Healthy Home Practices

Not Reporting on this Outcome Measure

Outcome #11

1. Outcome Measures

Increase in Reported Confidence and Capability to Make Smart Health Insurance Decisions.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The 2010 Affordable Care Act (ACA) changed health insurance plans for both the insured and the uninsured. Currently insured consumers need to understand changes that impact their purchase decisions. Newly-eligible consumers need to understand how to purchase health insurance . Research shows almost all consumers are confused about health insurance purchase and use.

What has been done
To increase consumer capability and confidence around selecting and purchasing health insurance that best meets the needs of themselves and their families. UME has developed Smart Choice Health Insurance curriculum and subsequently trained Extension Educators across the nation to implement this educational program in their local communities.

Results
Smart Choice Health Insurance© Workshops have impact. People leave with confidence to make smart health insurance purchase decisions. This finding is based on data from 994 consumers who participated in the Smart Choice research and education project. The increase in confidence and likeliness to take action was reported by consumers of all sex, race, education, and income levels, and regardless of whether they currently had health insurance or not.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
801	Individual and Family Resource Management

Outcome #12

1. Outcome Measures

Increased Research Findings that Contribute to Individuals and Families Well-being and Quality of Life

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Health literacy and health communication are necessary components to living a healthy life. As

people age, they are more likely to need health literacy and positive health communication as it increases the ability to access and understand health information. However, research shows only 12% of the adult population are proficient in health literacy. Further, this is a dynamic concept that can change based on circumstance and life situation of the person. Older adults, with their increased probability for health conditions and their more constant contact with doctors, is a group which needs to possess proficient health literacy

What has been done

A health communication pilot program for older adults was developed with the goal to increase the intent of someone to communicate openly and honestly with a physician. This would lead to better diagnosis, increase access and understanding of health information, and increase quality of life in participants. The Theory of Planned Behavior was used to develop and guide the program components and evaluation.

Results

The program was pilot tested with 134 people. Evaluation results indicate that people's attitude towards health communication increased, their positive subjective norms increased and perceived behaviors decreased, thus leading to an increase in behavioral intent. At three month follow-up, responding participants indicated they have used the information at their most recent visit to talk with their doctor. The difference it has had on participants is that they are more organized and in control of their health care.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Certified Smart Choice Extension Educators taught 134 workshops in seven states between September 2013 and May 2014. Impact of the workshops was measured by valid and reliable questions developed and tested by the American Institutes of Research (AIR). The

main questions and answers generated through data analysis were:

1) Did participation in the Smart Choice health insurance workshops relate to an increase in consumers' confidence to make a smart health insurance decision? On a scale of 1 to 4, with 1 being not at all confident and 4 being very confident, consumers moved from 2.2 before the workshop to 3.11 at the end of the workshop-- an increase in confidence.

2) Did participation in the Smart Choice health insurance workshops relate to an increase in consumers' likelihood to compare health insurance plans on such items as what they would have to pay for prescription drugs, or emergency department visits, or specialist visits? Using the same scale of 1 to 4, with 1 being not at all likely and 4 being very likely, consumers moved from 2.9 before the workshop to 3.33 at the end of the workshop--an increase in likelihood to take action.

The change in the confidence scores was statistically significant, indicating that the workshop increased consumers' confidence. The change in consumers' perceived capability to take action scores was statistically significant, indicating that they were likely to:

• Determine which doctors and hospitals are covered.

• Understand what they would have to pay for prescription drugs, emergency departments, and specialist visits.

• Find out if they have to meet a deductible and if unexpected costs are covered.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Sustainable Energy

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%	100%	0%	23%
112	Watershed Protection and Management	0%	0%	0%	27%
302	Nutrient Utilization in Animals	0%	0%	0%	35%
403	Waste Disposal, Recycling, and Reuse	40%	0%	50%	0%
511	New and Improved Non-Food Products and Processes	0%	0%	0%	15%
601	Economics of Agricultural Production and Farm Management	60%	0%	40%	0%
801	Individual and Family Resource Management	0%	0%	10%	0%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	5.0	1.0	4.0	6.0
Actual Paid	5.0	0.0	4.0	5.0
Actual Volunteer	4.0	0.0	4.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
170637	67828	249909	158825
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
170637	67828	249909	56384
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
146102	0	14392	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Short course and training seminars for industry personnel and growers;
- Conduct basic and applied research in alternative fuel sources, energy saving techniques and recycling of green waste products;
- Contribute to trade and peer reviewed journal publications.

2. Brief description of the target audience

- Nursery, greenhouse, poultry growers and managers;
- In-state bioenergy industry;
- Research community at large.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	620	4791	3624	0

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	4	21	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- 1. Alternative Energy Options and Energy Conservation & Efficiency (Agronomic, Poultry, Dairy & Green Industry): Number of workshops, seminars & twilight tours; Publications; Grants; Extension faculty engaged in programs.

Year	Actual
2014	45

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	1. Alternative Energy Options and Energy Conservation & Efficiency (Agronomic, Poultry, Dairy & Green Industry): Number of participants attending programs; Growers implementing new energy savings/conservation options; New energy systems installed.
2	Research: Providing Energy to Low-Income Households

Outcome #1

1. Outcome Measures

1. Alternative Energy Options and Energy Conservation & Efficiency (Agronomic, Poultry, Dairy & Green Industry): Number of participants attending programs; Growers implementing new energy savings/conservation options; New energy systems installed.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Every year thousands of low-income households are simply not able to afford energy services, fall into arrears, and end up at risk of being disconnected. For decades, analysts have argued that there are opportunities to decrease energy demand with low-cost behavior change. Whereas the barriers to such opportunities is still a hotly debated topic, recent evidence suggests that providing energy information can lead to short-term and long-term reduction in energy usage. But, important research questions remain about the effectiveness of different technologies for providing information to customers and about specific impacts on low-income households. For instance, energy education that aims to engage households in active learning about low-cost behavior change has been seen as a promising solution.

What has been done
Using a low-cost randomized experiment, MAES is investigating the role of energy education provided to low-income households that face the risk of disconnection from their utility services. The first goal is to evaluate whether energy education can lead to a decrease in energy demand. The second goal is to investigate the effectiveness of different educational technologies, such as providing education online versus in-person.

Results
The study is being implemented in collaboration with the Fuel Fund of Maryland (FF), a non-profit organization that has provided energy assistance to low-income households for more than thirty years. Since 2008, FF has been running Watt Watchers (WW), a program that provides energy

education, fostering the adoption of energy efficient behavior. WW is rolling out an online tool this year.The first complete analysis will not be out until mid-2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
403	Waste Disposal, Recycling, and Reuse
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Research: Providing Energy to Low-Income Households

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Low-income households allocate a disproportionally high share of their disposable income to energy expenses relative to other households. According to the Energy Information Administration, American households with an annual income lower than $20,000 spent at least 7.9% of their income on energy. This number is less than 0.3% for households earning more than $120,000 per year. As a result, policies that aim to internalize negative externalities in the energy sector are notoriously regressive. Every year, thousands of low-income households are simply not able to afford energy services, fall into arrears, and end up at risk of being disconnected.

What has been done
Using a low-cost randomized experiment, MAES is investigating the role of energy education provided to low-income households that face the risk of disconnection from their utility services. The first goal is to evaluate whether energy education can lead to a decrease in energy demand. The second goal is to investigate the effectiveness of different educational technologies, specifically comparing whether providing education online versus in-person has different impacts.

Results

Data are still being collected to perform the main analysis. To complete the research, 7,000 to 10,000 households must be enrolled in the energy education program. So far, about one-third of the required participants has enrolled. However, interim analysis has revealed interesting patterns regarding compliance rate. For instance, about 33% of participants in need of bill assistance that were required to graduate from an onsite "Watt Watchers" actually graduated from the class. For participants assigned to the online class, the graduation rate is 38%.

4. Associated Knowledge Areas

KA Code	Knowledge Area
{No Data}	null

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Economy
Appropriations changes
Public Policy changes
Government Regulations
Competing Public priorities
Competing Programmatic Challenges

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Results to date with the "Providing Energy Education to Low-Income Households" have found that about 33% of participants in need of bill assistance that were required to graduate from an onsite Watt Watchers actually graduated from the class. For participants assigned to the online class, the graduation rate was 38%. The fact that graduation rate of the online class is only slightly higher is a surprise and an important finding. One of the main goal of creating the online class was to lower the hassle cost of attending the Watt Watchers class. Several of the participants, are single mother working several jobs, for instance, which makes it hard for them to attend on-site classes.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Childhood Obesity

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior	50%	100%	100%	0%
704	Nutrition and Hunger in the Population	5%	0%	0%	0%
724	Healthy Lifestyle	35%	0%	0%	0%
806	Youth Development	10%	0%	0%	0%
	Total	100%	100%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	9.0	1.5	5.0	0.5
Actual Paid	8.0	0.0	5.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
341273	135656	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
341273	135656	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
292204	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Develop/implement training for cafeteria/food service workers using Walk the Line curriculum.
- Workshops and professional development for Growing Healthy Habits, Farm-2-School, and Walk the Line.
- Create effective materials and programs that meet standards of health literacy.
- Investigate taste preference and trying new fruits and vegetable measures for statewide evaluation.
- Educational programs for cafeteria and food service workers and school administrators.
- Educational programs targeting pre-schoolers and their parents through train-the-trainer approach for child care and pre-school teachers.
- Up For the Challenge curriculum implemented for school-age youth in 3 sites targeted to geographically dispersed military families/youth.
- Contribute articles and expertise to eXtension.org Community of Practice for Food, Fun, and Fitness
- Develop Social Marketing and Social networking strategies to engage target audiences in Healthy Living dialogue
- Conduct applied research to inform educational program interventions.

2. Brief description of the target audience

- School-age youth
- Parents of school-age youth
- Teachers
- Cafeteria/Food service workers
- School administration
- Providers of before and aftercare
- Limited Income Mothers and Children
- Food Stamp recipients
- Geographically dispersed military families

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	55379	500	38723	700

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	8	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Growing Healthy Habits: # workshops; # train-the-trainer sessions; # school gardens developed; # community gardens developed; # new partnerships to implement GHH.

Year	Actual
2014	2892

Output #2

Output Measure

- Walk The Line: # sessions conducted; # school cafeteria workers trained; # cafeterias participating
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Farm 2-School: # Sessions conducted; # schools participating; # farmers participating; # New partnerships developed.

Year	Actual
2014	2408

Output #4

Output Measure

- Eating Smart/Being Active: # youth served; # sessions; # supporting resources developed.

Year	Actual
2014	241

Output #5

Output Measure

- Up For the Challenge: # sessions conducted; # youth reached; # teachers/afterschool providers trained; # schools implementing

Year	Actual
2014	36

Output #6

Output Measure

- Strong Women, Healthy Hearts: # women completing program; # sessions conducted; # partnerships developed to implement program
  Not reporting on this Output for this Annual Report

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	1. Fruit & Vegetable Consumption: # youth planning to increase consumption of fruits and vegetables.
2	2. Healthy Eating & Physical Activity: # of individuals and families who gain awareness, knowledge, or skills regarding healthy eating and physical activity
3	3. Policy Change: # schools, businesses and organizations with increased awareness of needed systems changes that will positively impact intake of healthier foods.
4	4. Systems Changes: # schools, businesses or organizations making systems changes to promote healthy lifestyles
5	5. Physical Activity: # youth and adults including physical activity in daily routine at least three times weekly

Outcome #1

1. Outcome Measures

1. Fruit & Vegetable Consumption: # youth planning to increase consumption of fruits and vegetables.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Recent studies have found that lifestyle choices and physical activity practices are established very early in life and have an impact on future health and well-being. Thus, preschool-age is a critical time for nutrition education intervention.

What has been done
FSNE reached over 5,000 preschool-aged children through nutrition and gardening focused curricula, including Color Me Healthy; Read for Health; and Grow It, Try It, Like It. These nutrition education programs encourage healthy eating and physical activity through multiple interventions, including music, dance, children's books, fruit and vegetable tastings, and gardening/planting activities.

Results
Childcare providers and parents of preschool-aged children participated in curricula that encouraged healthy feeding practices. 1-2-3 Feed Me!, a childcare provider centered program, and Feeding for Healthy Eating (FHE), a parent-focused intervention, encourage adults to role model healthy eating, cook and eat with children, and introduce new foods to children. Ninety-one percent of FHE parents report often or always encourging their children to make independent food decisions by determining when they are full; 86% report offering foods to children a second time if they did not like them initially; and 94% of childcare providers plan to implement healthy feeding practices through role-modeling healthy eating behavior.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #2

1. Outcome Measures

2. Healthy Eating & Physical Activity: # of individuals and families who gain awareness, knowledge, or skills regarding healthy eating and physical activity

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Healthy eating habits along with regular physical activity have an important role in weight control. Despite the proven benefits of these healthy habits, the CDC State Indicator Report for Maryland shows that less than 16% of adults report eating the recommended daily servings of both fruits and vegetables. Unfortunately, the statistics for adolescents are worse, with only 11% reporting daily consumption of the recommended amounts. Finding ways to increase fruit and vegetable consumption is vital to improving health and well-being.

What has been done
FSNE delivered nutrition education programs that focused on dietary quality choices and food resource management to over 5,600 adults.
On average, adults received nutrition education through a series of five, 60-minute classes featuring food demonstrations, tastings, and real world application of learned skills.

Results
After participating in the FSNE nutrition education classes, adults
report significant positive changes in their daily consumption of fruits and vegetables. Adults reports they have increased their daily servings of fruits and vegetables by 23% percent for a total of five servings consumed per day. They also report they change their patterns of consumption at meals, saying they always or often eat two or more vegetables at their main meal.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #3

1. Outcome Measures

3. Policy Change: # schools, businesses and organizations with increased awareness of needed systems changes that will positively impact intake of healthier foods.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Overweight and obesity have reached epidemic proportions nationwide and have become two of the most critical issues of our time. Over the years, environmental changes have resulted in trends toward inactivity and poor diets. It has been stated that children establish eating habits early in life and these are often the results of interactions with parents and caregivers.

What has been done
In FY13, 165 elementary and middle-school teachers participated in intensive teacher training programs, including the Integrating Nutrition into the School Curriculum (INC) and Youth Gardening for Nutrition courses. These 30-hour training programs are conducted in collaboration with MSDE and focus on increasing the integration of nutrition and gardening education into existing school subjects, including math, reading, and language arts.

Results
After participating in the training, teachers report integrating nutrition and gardening activities on a weekly basis. The amount of time they encourage students to share healthy eating messages also increased from monthly to weekly after the training course. Nine out of 10 teachers report that their students speak more positively about healthy eating and physical activity. number of

healthy eating opportunities for students nine-fold to once per month during the school year. Teachers share healthy eating and physical activity
information with parents on a monthly basis after participating in the teacher training.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #4

1. Outcome Measures

4. Systems Changes: # schools, businesses or organizations making systems changes to promote healthy lifestyles

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Overweight and obesity have reached epidemic proportions nationwide and have become two of the most critical issues of our time. Over the years, environmental changes have resulted in trends toward inactivity and poor diets. It has been stated that children establish eating habits early in life and these are often the results of interactions with parents and caregivers.

What has been done
ReFresh is a partnership between Maryland State Department of Education (MSDE) and the University of Maryland Extension (UME) to utilize partnerships between food service staff, instructional staff, and UME educators within the school setting to work to increase students preference and selection of fruits and vegetables. FSNE provided classroom-based nutrition education in low income schools and in the development of the ReFresh curriculum for 4th and 5th grade students.

Results

FSNE educators trained 31 teachers to deliver the ReFresh curriculum in their schools. Youth who participate in ReFresh make healthy choices regarding their lunchtime meals. 95% of students report regularly eating fruit with lunch, while 82% report regularly consuming vegetables at their lunchtime meal. Youth who participate in ReFresh report significant increases in their preference for healthy foods, including fruits, vegetables, and whole grain foods - 86% report liking vegetables, 98% report liking fruits, and 94% report liking whole grain foods after participating in the curriculum.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #5

1. Outcome Measures

5. Physical Activity: # youth and adults including physical activity in daily routine at least three times weekly

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Healthy eating habits along with regular physical activity have an important role in weight control and decrease the risk of chronic disease. Obesity, diabetes, heart disease, cancer, food allergies and lack of exercise are among the priority health risks that must be addressed.

What has been done
FSNE reached over 650 senior adults through nutrition education programming in FY13. The two primary programs utilized with this population were Eat Smart, Live Strong and Eating Smart, Being Active, which encourage participants to eat more fruits and vegetables and to engage in moderate-intensity daily physical
activity.

Results

After participating in the programs, seniors intend to make significant, positive changes to their daily health behaviors,
specifically by engaging in at least 30 minutes of physical activity during the day,as well as increasing the number and variety of fruits and vegetables they consume on a daily basis.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Nutrition to GO! - Approximately 20% of the low-income adults served by Maryland FSNE were reached through Nutrition to GO! displays that provide simple, clear information on nutrition or physical activity concepts. Before attending Nutrition to GO! events, participants report rarely thinking about/knowing the calorie content of their foods and beverages; a fter programming, they report plans to increase their awareness of the nutrition content of their food and beverage choices to go. Before Nutrition to GO! programming, participants report rarely choosing smaller portions of food; a fter programming, they report an intention to choose smaller portions of food.
In FY13, 22,733 youth were reached through nutrition education curricula delivered both in-school and outside of the classroom environment, such as after-school programs and gardening clubs. School-aged youth received nutrition education through primary nutrition-focused curricula, including Nutrition Nuggets, Read for Health, ReFresh, Media Smart Youth, and Up for the Challenge. Nearly 20% of youth participants were reached through Growing Healthy Habits, a gardening for nutrition education program focused on enhancing students' tasting and preference for locally grown vegetables. Youth in these programs report an increase in the amount of new vegetables they try, and their preference for locally grown vegetables, which are the two primary goals of this curricula. Further, when youth prefer foods, they are more likely to select and consume them.

Students report a signi ficant increase in their preference for 11 vegetables, including lettuce, spinach, zucchini, cauli flower, cabbage, broccoli, tomatoes, summer squash, peppers, cucumbers, and radishes. of students report tasting zucchini and summer squash for the rst time during the program report tasting radishes for the rst time during the program Youth in grades 3 and higher who participate in these programs report an increase in the amount of new foods they try, the total number of fruits/vegetables they consume, and their preference for healthy foods.

Key Items of Evaluation

FSNE educators worked with farmers' markets throughout the state of Maryland to encourage shoppers to add nutrien-trich, in-season fruits and vegetables to their diets. A fter ending events that offer recipe demonstrations, 78% of adults report that they plan to buy the healthy ingredients used in the recipe so they could prepare it themselves. Seventy-six percent of participants plan to involve their family in the preparation of the recipe.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Food Safety

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	10%	100%	100%	0%
205	Plant Management Systems	10%	0%	0%	50%
404	Instrumentation and Control Systems	10%	0%	0%	0%
501	New and Improved Food Processing Technologies	20%	0%	0%	0%
502	New and Improved Food Products	20%	0%	0%	0%
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	10%	0%	0%	25%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	20%	0%	0%	25%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	9.0	1.5	5.0	4.0
Actual Paid	8.0	0.0	1.5	6.7
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
341273	135656	937159	326647
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
341273	135656	937159	420445
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
292204	0	53970	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Develop technical assistance programs for UME
- Develop and/or adapt food safety materials and resources for UME Educators
- Collaborate with local, regional, and national partners
- Develop safe food educational materials/ resources and disseminate USDA food safety materials to consumers and producers
- Conduct trainings and workshops, including train-the-trainer workshops
- Conduct evaluations
- Promote and support Maryland Farm to School and other agricultural literacy programs
- Conduct data analysis, needs assessments, environmental scans, and asset mapping
- Network internally and externally with collaborators, partners, and affiliates
- Raise community and stakeholder awareness of local food issues
- Develop online food safety modules
- Conduct social marketing awareness education focusing on food safety
- Conduct basic and applied research to inform program development regarding food-borne illnesses and beneficial and safe compounds in the food.

2. Brief description of the target audience

- Consumers: Youth, adults, older adults
- Commercial: Fruit and vegetable producers
- Food service workers, childcare workers, community-based organizations
- Service agencies related to food production, promotion, consumption, protection, education

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2500	4751	0	101

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	5	5	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- 1. Food Safety Practices: # training sessions; # trained; # courses developed; # publications; # Mass Media

Year	Actual
2014	2505

Output #2

Output Measure

- 2. Good Agricultural Practices (GAP): # of fruit and vegetable farmers implementing Good Agricultural Practices;# of fruit and vegetable producers attending GAP training; # of GAP workshops, seminars, consultations.

Year	Actual
2014	58

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	1. Food Safety Practices: Participants will gain basic food safety knowledge and skills, resulting in an intent to adopt the following: Follow the key safe food handling recommendations (clean; separate; cook; chill) -Wash hands before working with food -Clean food preparation utensils and surfaces -Wash fruits and vegetables before eating and preparing - Keep raw food/meat separate from ready to eat foods -Cook and chill food to safe temperature using a food thermometer -Store foods at a safe temperature using an appliance thermometer
2	2. Good Agricultural Practices (GAP): Maryland's fruit and vegetable producers implement Good Agricultural Practices in their operations to prevent contamination and ensure a safe food supply.

Outcome #1

1. Outcome Measures

1. Food Safety Practices: Participants will gain basic food safety knowledge and skills, resulting in an intent to adopt the following: Follow the key safe food handling recommendations (clean; separate; cook; chill) -Wash hands before working with food -Clean food preparation utensils and surfaces -Wash fruits and vegetables before eating and preparing - Keep raw food/meat separate from ready to eat foods -Cook and chill food to safe temperature using a food thermometer -Store foods at a safe temperature using an appliance thermometer

2. Associated Institution Types

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Maryland Crabmeat Quality Assurance and Inspection Program (MCQAP) is a unique voluntary quality management program in which Maryland crab processors have the opportunity to join and undergo evaluations and assistance beyond the regular inspections performed by FDA and state health regulators. The program has conducted sanitation audits and process verification studies in crabmeat processing plants, and microbiological analysis for crabmeat and environmental swab samples.

What has been done
A total of 1322 samples were collected from participating companies. The microbiological tests were performed at the UMES Center for Food Science and Technology. At the end of this year's crab season, 167 industry reports, representing approximately 5219 test procedures, were prepared and mailed to participating processors detailing the microbiological status of their operations, implications, and recommendations.

Results
One major value of this program was to help 100% of the participating industry totally eliminate the dangerous human pathogens E. coli from their crabmeat and processing environments (0% positive for E. coli in crabmeat, food and non-food contact surfaces). Another program results was

to help the industry identify and control Listeria monocytogenes in both crabmeat and environmental swab samples. In 2014, the rate of occurrence of Listeria monocytogenes in the crabmeat and environmental swab samples was 0.76 % (1/131) and 0 % (0/595), respectively.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
501	New and Improved Food Processing Technologies
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #2

1. Outcome Measures

2. Good Agricultural Practices (GAP): Maryland's fruit and vegetable producers implement Good Agricultural Practices in their operations to prevent contamination and ensure a safe food supply.

2. Associated Institution Types

- 1862 Extension
- 1862 Research
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Several outbreaks of foodborne illness have been traced to contaminated fruits and vegetables that were either grown domestically or imported. Presently, the U.S. Food and Drug Administration (FDA) is reviewing regulations that govern the produce industry and early drafts indicate that fruits and vegetables from all size farm operations will need to comply with proposed regulations. Therefore, it is evident that producers need to be more aware of GAPs and the changing regulatory environment which includes an emphasis on water quality.

What has been done
Vegetable grower sites were selected to represent Maryland's various geographic areas including the Eastern Shore, Southern, Central and Western regions. Monthly samples were taken from 27

water sources (including ponds, wells and springs). The project was started in 2013 and repeated in 2014 using many of the same farms as in the 2013 study; however, the water samples were tested for E.coli, total coliform bacteria, pH, nitrates and turbidity (the nitrate test replaced the electrical conductivity test).

Results

At grower meetings in early 2014, 2013 summary data was used to illustrate the vast range of water pH (3.9 to 9.7) and how E.Coli (an indicator for contamination) counts can vary widely due to water sources and month. Where water quality was compromised by potentially hazardous levels of bacterial contamination, growers became aware of their individual situations and made plans to install mitigation measures to reduce or eliminate contamination.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
205	Plant Management Systems
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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Maryland Crabmeat Quality Assurance and Inspection Program (MCQAP) is a unique voluntary quality management program with partial funding from the industry, in which Maryland crab processors have the opportunity to join and undergo evaluations and assistance beyond the regular inspections performed by FDA and state health regulators. The program has conducted sanitation audits and process verification studies in crabmeat processing plants, and microbiological analysis for crabmeat and environmental swab samples. Almost two thirds of Maryland crabmeat processors belong to the program. Routine microbiological inspections conducted through MCQAP ensure compliance with state regulations and the guidelines of the Chesapeake Bay Seafood Industries Association. Reports of the inspection and lab test results are mailed to each participating processing plant, and may include recommendations if findings warrant changes in sanitation procedures. This year, 13 Maryland crab processors, including one company located in

Smith Island, have joined this unique voluntary program. A total of 1322 samples were collected from participating companies during this year (between April and November). The microbiological tests were performed at the UMES Center for Food Science and Technology. At the end of this year's crab season, 167 industry reports, representing approximately 5219 test procedures, were prepared and mailed to participating processors detailing the microbiological status of their operations, implications, and recommendations. One major value of this program in 2014 was to help 100% of the participating industry totally eliminated the dangerous human pathogens E. coli from their crabmeat and processing environments (0% positive for E. coli in crabmeat, food and non-food contact surfaces). Another value of the program was to help the industry identify and control Listeria monocytogenes in both crabmeat and environmental swab samples. Federal and state health regulators do not accept this pathogenic bacterium at any level in ready -to -eat seafood. In 2014, the rate of occurrence of Listeria monocytogenes in the crabmeat and environmental swab samples was 0.76 % (1/131) and 0 % (0/595), respectively.

During 2014, three Seafood HACCP Training Workshops (Seafood HACCP Segment 2 Course and HACCP Course for Shellfish Shippers) were rotated in Maryland and Delaware. The Seafood HACCP Segment 2 Course was a one-day practical course that must be provided by certified trainers in accordance with the established protocol recognized by the Association of Food and Drug Official (AFDO) and the U.S. Food and Drug Administration (FDA). This was a must for individuals who needed to demonstrate compliance with the training requirements of the FDA, state health departments and regulatory agencies. During this course, participants reviewed HACCP principles, the FDA regulations, and the FDA Hazards Guide. Participants also worked in groups to conduct a Hazard Analysis and developed a HACCP plan for a model seafood business assigned by the instructors. In 2004, a total of 57 individuals from seafood handling, processing, packing, storing, transportation and distribution, and shellfish growers and shippers registered for the Seafood HACCP Segment 2 Course and the HACCP Course for Shellfish Shippers. By completing these courses, 22 participants received a certificate of course completion from AFDO that met the FDA Seafood HACCP Regulation training requirements (21 CFR 123.10) and additional 33 attendee were qualified for shellfish operation.

Key Items of Evaluation

Presently, the U.S. Food and Drug Administration (FDA) is reviewing regulations that govern the produce industry and early drafts indicate that fruits and vegetables from all size farm operations will need to comply with proposed regulations. Therefore, it is evident that producers need to be more aware of GAPs and the changing regulatory environment which includes an emphasis on water quality. GAP survey work conducted in 2010 and 2013 revealed that many growers did not have water quality data about their water sources on their farms. This study was conducted to develop baseline information by analyzing microbial water quality during the vegetable production months and by major water sources utilized in Maryland vegetable operations. This baseline data will be used for program development in the years ahead.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

4-H Youth Development

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
724	Healthy Lifestyle	25%	25%	0%	0%
802	Human Development and Family Well-Being	25%	25%	0%	0%
806	Youth Development	50%	50%	0%	0%
	Total	100%	100%	0%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Paid	17.0	0.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
511910	203484	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
511910	203484	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
438305	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. 4-H community clubs will be conducted focusing on activities that support youth learning science and technology, healthy living, and citizenship
2. 4-H school enrichment programs
3. 4-H Operation Military Kids programs
4. Camping programs
5. State and county fairs
6. Demonstrations
7. Other special interest clubs and activities, such as Health Rocks!

2. Brief description of the target audience

- All youth in the State of Maryland
- All youth who are children of military parents
- All adults with an interest in becoming 4-H volunteers
- Businesses who would be interested in financially supporting 4-H programs
- Community partners

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5970	200654	72004	76225

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of community club programs offered

Year	Actual
2014	380

Output #2

Output Measure

- Number of members enrolled in school-based clubs, community clubs, 4-H military programs, and camps

Year	Actual
2014	78874

Output #3

Output Measure

- Number of youth engaged in Science, Engineering, and Technology

Year	Actual
2014	61471

Output #4

Output Measure

- Number of youth engaged in building citizenship skills

Year	Actual
2014	20793

Output #5

Output Measure

- Number of youth involved in healthy lifestyles

Year	Actual
2014	31051

Output #6

Output Measure

- Number of adult 4-H leaders

Year	Actual

2014	5970

Output #7

Output Measure

- Number of youth enrolled through the Health Rocks program

Year	Actual
2014	14000

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase in youth reporting adoption of healthy eating behaviors
2	Increase in youth who intend to engage in community projects and community leadership positions
3	Increase in the number of youth and adults adopting animal science practices that demonstrate increased knowledge of raising animals in a responsible, ethical, and ecologically viable manner
4	Increase in youth who intend to pursue science-related careers
5	Increase in youth who practice environmentally responsible behaviors
6	Increase in youth and families who report becoming more literate in concerns surrounding global hunger and its relationship with agriculture, understanding of food systems, and the relationship of agriculture, food, nutrition, and the economy.
7	Volunteer Development: The number of UME trained 4-H volunteers who provide leadership and guidance for 4-H youth development programs.

Outcome #1

1. Outcome Measures

Increase in youth reporting adoption of healthy eating behaviors

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	18981

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Recent studies have found that lifestyle choices and physical activity practices are established very early in life and have an impact on future health and well-being. According to the CDC, childhood obesity has more than doubled in children and quadrupled in adolescents in the past 30 years.

What has been done
Maryland 4-H now has over 70 new 4-H Youth Healthy Living (HL) Ambassadors. These 4-H HL Ambassadors have been trained and have resources to provide healthy living activities for their clubs and counties to promote healthier lifestyles across Maryland. Using the Up For the Challenge and Health Rocks! curricula, these ambassadors are helping to create a healthier world by encouraging other youth and adults to eat healthier, live active lifestyles, and stay away from drugs and alcohol.

Results
The 4-H Nutrition Program provides innovative ways to help young people learn how to make wise choices that will prove beneficial to their overall health. They gain nutrition and health knowledge, develop physical fitness skills and some food safety. In the City of Baltimore, for example, the 2014 Summer Nutrition Program served 454 youth at 13 various community organization summer camps. Twenty-one staff from these organizations were trained to deliver nutrition lessons and received research based nutrition materials.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

802 Human Development and Family Well-Being

806 Youth Development

Outcome #2

1. Outcome Measures

Increase in youth who intend to engage in community projects and community leadership positions

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	20793

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research shows service matters in many ways and volunteering is associated with stronger communities. Civic engagement is a heightened sense of responsibility to one's community that includes a wide range of activities, including developing civic sensitivity, Participation in building civic society, and benefiting the common good. Equipping young people with the skills and knowledge to lead helps form the basis of being contributing citizens of communities.

What has been done
The Teen Corps Program targets, youth, ages 12-18 from communities throughout Baltimore City and adults who work with the youth as mentors.The 4-H Teen Corps Leadership Program (Teen Corps) employs the best practices of youth and community development. It enables Extension to engage youth and adults in community development opportunities for the purpose of creating community change.

Results
Members of Teen Corps established community garden projects, started entrepreneurial ventures in their communities, and implemented feed the hungry projects. They have participated and co-facilitated community-wide Master Plan meetings to promote revitalization efforts, collected and distributed holiday gifts for needy children and, established inter-generational programs with seniors. They have co-led the Baltimore City 4-H Youth Expo; which showcases the talents of youth from Baltimore City Public Schools and after school programs. Several thousand Baltimore City residents have been reached through this citywide initiative.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #3

1. Outcome Measures

Increase in the number of youth and adults adopting animal science practices that demonstrate increased knowledge of raising animals in a responsible, ethical, and ecologically viable manner

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4577

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
It is critically important that we teach 4-H youth in 4-H Animal Projects proper management practices to ensure not only the health and safety of their animals, but also to ensure the health and safety of the 4-H member and the general public. It is also important for 4-H members to learn to treat animals in an ethical manner, as they produce wholesome products and promote a positive image for animal industries. Youth must understand the visible and important roles they have as representatives of animal agriculture and the 4-H and FFA youth programs.

What has been done
To address the challenges associated with offering important livestock quality assurance training for thousands of 4-H animal science project members on a continual and widespread basis, a team from Maryland developed a new statewide on-line training program called the Maryland 4-H Animal Husbandry and Quality Assurance Program (AH&QA). The online program is updated and offered annually between March and July.

Results
Through 2014, AH&QA had been completed by 4,577 youth, each completing Part 2 of the program for an average of 1.7 species. Program outcomes include improved knowledge and understanding in the areas of: Important role youth have in animal agriculture, public concerns about animal welfare and animal product safety, proper handling of animals, proper use of animal

medications, importance of ethical behavior, animal care, common animal diseases, animal health, and animal nutrition by Maryland 4-H Members enrolled in and exhibiting in animal projects.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #4

1. Outcome Measures

Increase in youth who intend to pursue science-related careers

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	9114

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Maryland's population mass is largely located in Urban and Suburban areas that are isolated from agriculture science with several generations being removed from farm life. It is imperative to educate youth about Maryland's agricultural heritage and importance to keep agriculture a viable and successful industry. Teaching youth agriculture through science, technology, engineering, and math-related curriculum increases interest and success at completing post-secondary agriculture science degrees and gaining careers within agro-science fields.

What has been done
The University of Maryland Extension AGsploration program uses hands on experiential learning lessons to teach participants about science and agriculture in the hopes of increasing their awareness and appreciation of MD agriculture. It also strives to increase the amount of youth pursuing post-secondary degrees and careers in agriculture and science related fields.

Results
In 2014, two hundred individuals utilized the AGsploration curriculum in 26 states and territories. In Maryland ninety-two AGsploration lessons were taught to 6,192 program participants and 7 trainings were held to certify 168 new curriculum teachers. On pre/post tests of students all

indicated gaining more knowledge in the topics covered on agriculture and one in four participants indicated wanting to purse a degree or occupation in agriculture science. The AGsploration program has increased the knowledge and appreciation of agriculture in Maryland and created a network of trained individuals to more effectively continue the educational cycle.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #5

1. Outcome Measures

Increase in youth who practice environmentally responsible behaviors

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	3624

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Chesapeake Bay is Maryland's most prominent natural feature. The Bay and its watershed provide Maryland residents with a wide variety of resources. There is a need for environmental education programs that help youth and families understand ecological interactions in Maryland and adopt practices that can help to improve environmental water quality.

What has been done
The 4-H Environmental Science Action Team develloped a series of entomology lessons to be used as school enrichment in any county to address Maryland environmental literacy standards. Talbot and Caroline County 4-H collaborated with University of Maryland Eastern Shore and taught water quality monitoring through the AgDiscovery Program that serves diverse teens from across the country. Middle School teachers were trained to teach recycling lessons as school enrichment to incorporate Maryland environmental literacy standards.

Results
These efforts contribute to increased recycling rates and conservation of resources. 4-H environmental programs can help youth learn about the interactions between people and the

environment. Performance assessments of 853 youth and adults showed that 97% of participants learned to identify at least three hazards to the Bay and could identify three strategies for improving water quality.
Pre-/Post-assessments of 450 participants documented that mean self-rated high or very high knowledge of Chesapeake Bay ecology, water quality, and conservation techniques increased 47%, from 41% to 88%.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #6

1. Outcome Measures

Increase in youth and families who report becoming more literate in concerns surrounding global hunger and its relationship with agriculture, understanding of food systems, and the relationship of agriculture, food, nutrition, and the economy.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	18981

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Agriculture continues to be the largest commercial industry in the state of Maryland. However every year the population of Maryland becomes more urban, leaving youth with less of a connection to where their food comes from. When asking youth about where their food comes from at the beginning of classes a common response is "the grocery store". This lack of connection to the farms producing their food goes beyond not understanding what it takes to produce the food but also leads to a lack of understanding about the nutritional value of fresh produce and whole grains.

What has been done
Maryland 4-H offers a variety of classes, workshops, and programs focused on educating youth and their families about agriculture and food systems. These programs have been offered in urban schools, through week long camps, at community libraries, and at farms and/or farm parks.

Through these agricultural education programs students have been able to better understand where their food comes from, what it takes to produce it, and have studied the nutritional value of fresh produce and whole grains.

Results
A better understanding of the agricultural industry benefits all Maryland residents by fostering an appreciation for the largest industry in the state. Educating urban youth and families about the benefits of local agriculture helps lead to an increased consumption of local produce, thereby leading to higher sales at farmers markets. Understanding the benefits of fresh produce and whole grains in a balanced diet will lead to better eating choices and leads to a positive impact on childhood obesity.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #7

1. Outcome Measures

Volunteer Development: The number of UME trained 4-H volunteers who provide leadership and guidance for 4-H youth development programs.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	9994

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
With the typical busy lifestyle of Americans, it is important that organizations effectively recruit volunteers to support their ability to deliver programs to the community. In order to maintain enough adult volunteers to meet the needs of the many young people across the state, UME must continually recruit new individuals to serve as volunteers. Volunteer recruitment has become a necessary driving force behind all successful volunteer-based organizations and is thus being emphasized by UME leadership.

What has been done

The Maryland 4-H Volunteer Association develops and supports volunteers to serve the needs of 4-H volunteers and members throughout the state. The Association supports the delivery of information, service, and human and economic resources available to volunteers as provided by the 4-H program; provides means for Maryland 4-H volunteers to exchange mutually beneficial 4-H experiences and ideas; assists in providing training opportunities for Maryland 4-H volunteers; and serve as mentors to new 4-H volunteers and/or new clubs.

Results

The long-term impact of the program is that: 1) volunteers will have increased skills and knowledge to provide extraordinary learning experiences for youth; 2) there will be increased awareness of 4-H program as a provider of youth development programs for youth; and 3) it will increase the skills and knowledge of Extension professionals in delivering and managing volunteer programming.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

491 youth participated in the 4-H Nutrition and Fitness Education program in Baltimore City this year. 305 youth took the pre and post-test during the 6 week Summer Program. Results were that (1) 83% of youth gained knowledge and skills about My Plate; (2) 87% of youth gained knowledge and skills about eating healthy snacks; and (3) 84% of youth gained knowledge and skills about the important of eating breakfast. There were 15 volunteers trained from 9 city sites for the summer program and 4 volunteers trained for the fall afterschool program and community organizations to teach Up for the Challenge curriculum.

Key Items of Evaluation

For the past seven years, robotics teams from Garrett County have qualified to represent the state of Maryland at the FIRST world championship events. In 2014, the FIRST Tech Challenge (FTC) World Championship took place in St. Louis, Missouri with 100 teams from all over the United States in the competition and 28 teams from foreign countries. These represented the top 3% of all the FTC teams in the world. The 4-H-sponsored team, Techno Clovers, was a member of the first place alliance from among the more than 3,000 teams competing from around the world.
Brandeis University conducted an evaluation of the impact of participation in robotics competitive teams. Their research shows gains on key outcomes, including a better understanding of the use of science and technology in the real world; increased interest in STEM-related careers; increased interest in school success and college; and gains in life and workplace skills, such as, critical thinking, problem-solving, communications, and teamwork. In Garrett County, follow-up with 30 youth who completed two or more years on 4-H sponsored FTC robotics teams shows that of 88% are enrolled in college and 81% have selected a STEM- related major.
Regular participation in high quality afterschool programs is linked to significant gains in test scores, academic achievement and class participation as well as reductions in negative behaviors. The Baltimore County 4-H annual after-school participation has increased 2,246% from 15 in 2006 to 379 in 2014. Between 2006-2014, evaluations indicated that youth increased knowledge and skills in community engagement, workforce readiness and awareness, and science, engineering and technology.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
0	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.