

2015 Virginia State University and Virginia Polytechnic Inst. & State University Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

Virginia Cooperative Extension (VCE), a partnership between Virginia Polytechnic Institute and State University (VT) and Virginia State University (VSU), and the Virginia Agricultural Experiment Station (VAES) and the Virginia State University Agricultural Research Station (VSUARS), enables people to improve their lives through research and education using scientific knowledge focused on the issues and needs of the citizens of Virginia. Audiences are involved in designing, implementing, and evaluating needs-driven programs. VCE is a dynamic organization that stimulates positive personal and societal change leading to more productive lives, families, farms, and forests, as well as a better environment in urban and rural communities.

The overall education goal is to bring about change in people's knowledge, understanding, abilities, or behavior related to an issue and/or broader changes in economic, environmental, or social conditions. Progress towards these goals is recorded by planned program at the individual and team levels. The primary, overall research goal for Virginia is to develop relevant basic and applied research data to help solve the problems of the agricultural sector and to support the economic, environmental and social health of the commonwealth of Virginia.

VAES, VSUARS, and VCE PROGRAMMATIC GOALS: VCE's goals are to: 1) develop and transfer new knowledge in applied and basic life sciences, 2) perform relevant, objective, and timely research, 3) improve the quality of life for communities and citizens in the Commonwealth, 4) use a systems approach to programming, with task-oriented work teams that respond to the needs of individuals, groups, and organizations, 5) work with at-risk, underserved, and underrepresented audiences who need specialized attention, 6) fully integrate a culturally diverse paid and volunteer staff in planning, implementing, and evaluating programs, and 7) recruit and collaborate with public and private partners to better utilize resources, heighten impact, and reach a more diverse audience.

In particular, VSU's Extension program goals are to: 1) improve local and state economies by helping small and limited resource farmers and citizens garner resources to own, operate, and sustain small businesses, 2) educate and empower socially disadvantaged farmers to produce, distribute, and market organic, locally grown, and ethnic foods to feed Virginia's citizens, 3) ensure safe food supplies by teaching small-scale growers and farm families effective food safety practices, 4) address health issues and nutrition practices that confront limited-resource urban and rural citizens, 5) help youth, families, and seniors manage money to survive during challenging economic times, and 6) enable parents and families to leave their children in high quality and safe child-care environments.

VAES is committed to developing and implementing research that addresses society's needs and expectations. The College is focused on improving human and animal health and nutrition, enhancing the quality of the environment, reducing the effects of major infectious diseases, developing value-added products, building viable communities, and preventing chronic diseases such as obesity, heart disease, and diabetes. Research programs are conducted on the main campus as well as at the Agricultural Research and Extension Centers (AERC's) located across the commonwealth. The research focus of VSU's Agricultural Research Station includes the following: developing production systems that conserve natural resources; crop diversity and alternative crops; economically competitive and sustainable small-scale agricultural systems; bio-based energy production; improving food safety and quality; and value-added plant and animal products.

PLANNING: VAES, VSUARS, and VCE address a broad range of problems and issues facing citizens of Virginia through focused research and educational programming. The foundation for Research and Extension programs are built on the identification and prioritization of strategic issues through situation analyses, which are accomplished through the examination of trends and emerging issues identified by local advisory groups in Unit offices (Extension Leadership Councils), AREC Advisory groups, and individual Extension specialists. In 2013, every Unit office was asked to complete a local situation analysis. Unit profiles were created based on data gathered from a variety of sources such as US and Agriculture census data. Methods to collect community input included issue forums, focus groups, key informant interviews, and community surveys. Unit situation analyses become the background and rationale for deciding which problems and issues will be addressed and reported on by VAES, VSUARS, and VCE.

VCE is in the third year of a new program planning process that is based on the objectives identified in the 2011-2016 VCE Strategic Plan. Program Teams that are aligned with Strategic Plan objectives made up of agents, specialists, and others have been established. There are eleven Program Teams coordinating state level programming, including situation analysis, program planning, program development, evaluation, and reporting for the Strategic Plan objectives aligned with it.

VCE has stabilized in growth to approximately 250 agents after several years of new appropriations from the Virginia General Assembly. District Program Leadership Teams made up of experienced agents representing all program areas, are providing training and mentoring to new agents on development, delivery and evaluation of programs. This effort is enhancing the capacity of Virginia Cooperative Extension to deliver quality programs and be able to document the impacts of those programs.

REPORTING: All VT and VSU Extension and research faculty annually report through the VT College of Agricultural and Life Sciences' electronic Faculty Annual Reporting System (eFARS). This system includes annual program reports focused on faculty goals, outputs, outcomes, and other data for each planned program for teaching, research, and Extension at an individual, unit, college, and organizational level. Updates to eFARS and contact reporting in 2015 continue to better align planning and reporting with the 7 Planned Programs presented in this report. All research faculty are required to propose peer-reviewed Experiment Station projects submitted to USDA/NIFA, and entered into REEport. Researchers prepare annual progress and termination reports reviewed by the VAES director before being submitted to REEport.

PLANNED PROGRAMS: 1) Agriculture Profitability and Sustainability; 2) Biotechnology, Biomaterials and Energy; 3) Climate Change, Natural Resources and Environment; 4) Community Viability; 5) Food, Nutrition, and Health; 6) Strengthening Virginia Families; 7) Youth Development.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	339.0	27.0	248.5	15.5
Actual	362.8	22.7	314.5	13.5

II. Merit Review Process

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

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

2. Brief Explanation

Virginia Agricultural Experiment Station

Rationale and Review Committee Structure - Research under the Hatch, McIntire-Stennis, and Animal Health and Disease Acts is primarily conducted in three colleges that constitute the Virginia Agricultural Experiment Station (VAES): 1. College of Agriculture and Life Sciences, 2. College of Natural Resources and Environment, and 3. Virginia-Maryland Regional College of Veterinary Medicine. For each VAES project proposal submitted, the associate VAES director or the Associate Dean for Research in the project leader's college, chairs the review (hereafter referred to as the chair). The chair selects the project review committee consisting of three or more members proficient in the subject of the proposed project. They may be chosen from outside the university if recommended by the department/unit head or deemed appropriate by the chair. Faculty from other units within the university may be eligible for VAES support.

The research proposal is reviewed by the project review committee for technical merit and for fit within the mission of VAES, and is approved by the Director or Associate Director of VAES. More detail is provided below.

Proposal Development - The project leader prepares the proposal as specified in Essentials of a Project Proposal in the Administrative Manual for the Hatch (Experiment Station) Act as Amended, the Administrative Manual for the McIntire- Stennis Cooperative Forestry Program, and the Administrative Manual for the Continuing Animal Health and Disease Research Program (1992), Appendix F. Early in the new project development process, the project leader is strongly encouraged to initiate a subject search to identify previous and complimentary research.

The proposed research project is reviewed by a statistician, if appropriate, to assure the design and statistical analyses are adequate. The project leader may meet with a member of the Statistics Consulting Center or alternately, the department/unit head may designate someone with statistical expertise to serve as a departmental reviewer. The project leader then submits the proposal to his/her/unit head for peer review in accordance with departmental procedures. If the research involves animals, human subjects, or recombinant DNA, the project leader is responsible for submitting the required protocol forms to the appropriate university review committee(s). Proposals are not forwarded to USDA/CSREES without required approvals.

Proposal Submission and Review Procedures - The department/unit head transmits the approved project proposal to the chair of the project review committee for that college with following items transmitted to the chair electronically or uploaded onto a secure website: 1) the proposal, 2) the project leader's vita, 3) The Project Certification Form, 4) A Research Project Review Form, 5) Verification of statistical review, and 6) List of three or more suggested peer reviewers. The chair selects reviewers and distributes copies of the proposal to the reviewers, who return the Project Review Forms and comments to the chair by a specified date.

Proposal selection criteria include: 1.) proposed research relevance to the goals of the USDA, the department and college, the needs of the people the research would serve, and relevance to the priorities established by task forces, work groups, or commodity research committees, 2.) objectives and procedures are clearly stated, 3.) the proposed duration is realistic for the proposed research, 4.) the appropriate or desirable individuals are cooperating on this project, 5.) the project lists impacts to Virginia (and elsewhere) and/or anticipated economic importance, and 6.) the project leader's vita indicates the level of competence required for the proposed research.

Each reviewer recommends the proposal be: 1.) approved with no changes, 2.) approved with minor changes, 3.) revised and resubmitted, or 4.) rejected. The chair forwards reviewers' comments to the

project leader and department head prior to the review. The chair directs the review committee, the project leader, and the department head to review the proposal and comments. The oral review may be omitted for revised/replacement projects, at the discretion of the chair, if a majority of the review forms are checked by the reviewers as "approved with no changes" or "approved with minor changes." If an oral review is not conducted, the chair provides the review committee comments along with any comments or concerns on the part of the chair to the project leader with a copy to the department/unit head and the review committee. An oral review is required for a project leader's initial VAES Project.

Faculty located at off-campus Agricultural Research and Extension Centers (ARECs) submit proposals to the center director who contacts the appropriate department head on campus regarding departmental policy for securing a peer review before the proposal is sent to VAES for review. The center director forwards the proposal and departmental review, if applicable, and to the VAES director or associate director, who serves as chair. The chair forwards the proposal to the review committee and the subject matter department head, who is invited to participate in the review process.

Final Submission - The project leader complies with the recommendations of the Project Review Committee and submits the revised proposal to the department/unit head, accompanied by a letter delineating the changes made in response to the recommendations of the reviewers and/or a rebuttal for any recommendations, which the Project Leader does not accept. The Associate VAES Director reads and approves all final proposals, and reviews faculty responses to the reviewers' comments before proposals are submitted to the USDA. The project leader is responsible for filling out the needed USDA compliance forms.

For McIntire-Stennis proposals, the Administrative- Technical Representative (A-TR) must certify the proposal complies with the purposes of the McIntire-Stennis Act.

When the project leader, the department/unit head, the chair of the project review committee, and the director agree the proposed project should be accepted, the director approves it, assigns a project number and transmits the proposal and all necessary forms to the USDA. The USDA project reviewer may contact the director, assistant/associate director, or project leader with questions or for additional information. If a proposed project is deferred, the project reviewer notifies the director, who confers with the project leader, department/unit head, and chair of the project review. After approval by the USDA, the director sends copies of all relevant forms to the chair of the project review committee, department/unit head, and project leader. These documents, the proposal, and all pertinent correspondence are retained in the official project file in the VAES director's office for three years after termination of the project.

Program Review of VSU Agricultural Research

Virginia State University College of Agriculture has established a blue ribbon Advisory Council to provide guidance and advice to the Dean of the College of Agriculture, in particular, and to the College of Agriculture (COA) in general, to assist the College to meet the agricultural education, Extension and research needs of the residents of the Commonwealth of Virginia and as appropriate national and global needs. The College of Agriculture Advisory Council (CAAC) is composed of eighteen (18) members representing producers, business, agricultural experts, and other who have an interest in COA. At least five (5) of the Council members are producers representing a cross-section of agricultural enterprises served by COA. The members of the CAAC have been carefully selected; therefore, they will be able to assist the Dean and the College of Agriculture (COA) in developing/enhancing a proper perspective of needs and expectations of the clientele and stakeholders of the College of Agriculture as well as in

identifying resources that may be acquired to meet the challenges and exploit opportunities.

Evans-Allen Proposal Review

Development of Proposals - Any applicant at ARS who desires to submit a proposal for consideration must first complete and submit a Request for Approval to Submit Proposals Form to the Director of Research.

The Director of Research reviews the pre-proposal and notifies the applicant about a decision whether the proposal can be developed fully or not. All appropriate University and funding agencies' policies, procedures and guidelines should be adhered when developing a proposal.

Review of Full Evans-Allen Proposal - A full proposal is submitted by applicant(s) to the Director of Research for review. The Director then makes a determination on how the proposal is reviewed. It could be sent to external anonymous experts in the respective fields. The Director of Research's Office facilitates this process. The proposal is reviewed for addressing the needs of the state and people of Virginia and the United States, the degree of relevance of the proposed research to the land-grant mission and priorities of the University, the need for initiation of research in new areas, and other matters related to grantsmanship. The reviewers are asked to pay particular attention to scientific and technical merit, opportunities for cooperation in the proposed research with other individuals and units within the University and the Virginia clientele.

Based on the external reviewers' comments, the Director advises the applicant to address the concerns about the proposal or develop another one that incorporates the relevant suggestions.

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 selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of selected individuals from the general public
- Other (focus groups, listening sessions, issue forums, key informant interviews)

Brief explanation.

Virginia Cooperative Extension and Virginia Agricultural Experiment Station work with stakeholders to receive input through local Extension Leadership Councils and many other citizen groups at local and regional levels. The citizen groups reflect the agricultural producers and the socio-economic composition of their communities and focus on conducting programs which produce outcomes based on priority needs.

A systematic analysis of educational needs is integral for VCE program planning. Through situation analysis, needs of stakeholders are assessed, analyzed, and then shape program direction and plans. Traditional methodologies of seeking input include surveys, key informant interviews, issue forums, listening sessions and focus group interviews. To encourage participation, surveys are conducted with paper and web-based response options. Issue forums, listening sessions, and focus group interviews are held in multiple locations throughout service areas in convenient and comfortable environments for non-traditional and traditional stakeholders. Specific efforts are made to assess needs where underrepresented populations reside, and to market input sessions through communication channels used by targeted sectors of the population. During the spring of 2015, all

unit offices of VCE conducted a situation analysis.

Representation on local Extension Leadership Councils (ELCs) includes all VCE programming areas: 4H/Youth Development (4H), Family and Consumer Sciences (FCS), Agriculture and Natural Resources (ANR), and Community Viability. Currently, all 107 Extension units in Virginia have an organized local ELC and all Agriculture Research and Extension Centers (ARECs) have active advisory councils. At the state level, VCE works with stakeholders through the state Leadership Council (VCELC). The group includes volunteers representing 22 planning districts in Virginia, at large members appointed by the director of VCE, leaders representing Virginia's diverse population, businesses, agencies, organizations, VCE District Directors, VCE Director from VT, VCE Administrator from VSU, and deans of VSU and VT Colleges of Agriculture including the associate dean for research. State and local ELC meetings are held at times and locations convenient for the membership.

Virginia is a large, diverse state and as such, meeting locations are geographically distributed to ease travel burdens for members. Travel expenses are covered by VCE administration for meeting attendance. A faculty member works directly with the VCELC to assist with organizational development and logistics.

The VSU Extension program works with stakeholders through the VCELC for the systematic analysis of educational needs to plan Extension programs. To ensure that adequate stakeholder input is received from limited-resource and underserved audiences, VSU Extension is also informed by a VSU Agricultural Advisory Committee. Formed in 2008, the 15-member committee consists of members from agricultural commodity groups, the agri-business community, and public education. Other members include Extension professionals and volunteers, farmers, and a local legislator who advocates for the VSU School of Agriculture. All members work closely with or are aware of the needs of VSU's clients. Advisory Committees inform teaching, research, and Extension programs within VSU's College of Agriculture and research programs within VAES and the college. VCE advisory committee member guidelines were used as a basis for selecting VSU Agriculture Advisory members. Committee members represent the Extension program areas of 4-H, agriculture and natural resources, and family and consumer sciences and are invited to serve by the Extension administrators and Dean of the School of Agriculture. VCE and the ARECs have long facilitated grassroots involvement, buy-in, and ownership in local programs. VCE formally connects with the grassroots of the state through partnerships with local volunteer ELCs.

For the Virginia Agriculture Experiment Station (VAES), volunteer advisory councils provide stakeholder input. These partnerships represent the diversity of local clientele, communities, and industries across the Commonwealth of Virginia.

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 External Focus Groups
- Open Listening Sessions
- Use Surveys
- Other (Extension Leadership Councils)

Brief explanation.

The Virginia Agricultural Experiment Station (VAES) conducts research relevant to the needs and priorities of the citizens of the Commonwealth. Research projects are established based on the input of advisory committees at each of the thirteen Agricultural Research and Extension Centers (ARECs) distributed across the state. The twelve academic departments within the College of Agriculture and Life Sciences each maintain stakeholder groups and the College has its own

advisory committee of producers, commodity groups, and agribusiness leaders that provide important feedback to VAES. VAES provides research-based input to the VCE programming process through faculty research and Extension specialists and administratively through AREC directors and statewide Extension program leaders.

VCE formally establishes connectivity with stakeholders of the state through partnerships known as Extension Leadership Councils (ELCs). At the local level, this partnership represents the diversity of each county and city in which VCE exists as a resource. Representation includes VCE programming areas (4-H/Youth Development, Family and Consumer Sciences, Agriculture and Natural Resources and Community Viability), community leaders, and other organized community, agricultural, and youth associations and entities who partner with VCE.

Extension staff and Leadership Council members work as equal partners to determine needs, establish program priorities, plan and implement solutions, identify and secure resources, market VCE and its programs, and evaluate and report program results/impacts to program stakeholders. Currently, all 107 Extension units in Virginia report having an organized local ELC.

At the state level, local connectivity is achieved through the Virginia Cooperative Extension Leadership Council (VCELC). The partnership includes volunteer leaders representing the 22 planning districts of Virginia, at-large members appointed by the director and administrator, all VCE District Directors, the VCE Director (VT), the VCE Administrator (VSU), the director of governmental relations at VT, and the deans of the 1862 and 1890 land grant colleges.

Extension provides a formal mechanism for VSU and VT to receive stakeholder input for Extension and research programs. The situation analysis process in communities examines and determines what issues, problems, and opportunities exist that VCE resources should address (<http://www.ext.vt.edu/vce/support/process/situation.html>). An essential component of the process includes development of a unit profile (<http://www.ext.vt.edu/vce/support/unitprofiledata.html>). The unit profile developed by local agents is shared with ELCs to determine which key informants should be involved in situation analysis (<http://www.ext.vt.edu/vce/support/keyinterviews.doc>).

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
- Other (focus groups, key informant interviews, public issues forums, listening sessions)

Brief explanation.

A systematic analysis of educational needs is integral for VCE program planning. Through situation analysis, needs of stakeholders are assessed, analyzed, and then shape program direction and plans. Traditional methodologies include surveys, key informant interviews, issue forums, listening sessions and focus group interviews. To encourage participation, surveys are conducted with paper and web-based response options. Issue forums, listening sessions, and focus group interviews are held in multiple locations throughout service areas in convenient and comfortable environments for non-traditional and traditional stakeholders. Specific efforts are made to assess needs where underrepresented populations reside, and to market input sessions through communication channels used by targeted sectors of the population.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- In the Action Plans
- To Set Priorities
- Other (staff professional development)

Brief explanation.

A systematic analysis of educational needs is integral for VCE program planning. Through situation analysis, needs of stakeholders are assessed, analyzed, and then shape program direction and plans. Traditional methodologies include surveys, key informant interviews, issue forums, listening sessions and focus group interviews. To encourage participation, surveys are conducted with paper and web-based response options. Issue forums, listening sessions, and focus group interviews are held in multiple locations throughout service areas in convenient and comfortable environments for non-traditional and traditional stakeholders. Specific efforts are made to assess needs where underrepresented populations reside, and to market input sessions through communication channels used by targeted sectors of the population.

Brief Explanation of what you learned from your Stakeholders

Stakeholder input helped shape the future direction of Virginia Cooperative Extension and resulted in strategic goals through 2016.

2011 - 2016 Focus Areas and Goals, all established with stakeholder input follow:

Focus Area I: Enhancing the Value of Virginia's Agriculture

- Increase the profitability and sustainability of Virginia's commercial food, fiber, animal recreation, and green industries.
- Prepare the agriculture industry for future opportunities and challenges in urban and rural environments.
- Research and disseminate methods and recommendations to ensure that consumers have access to safe, high-quality agricultural products.
- Develop and deliver programs to enhance agricultural literacy.
- Interpret policy and legislation, identify opportunities, and provide training to comply with regulations that ensure farm profitability and environmental quality.

Focus Area II: Sustaining Virginia's Natural Resources and the Environment

- Support the management, use, and sustainability of Virginia's natural resource capital for the benefit of future generations.
- Provide natural resource and environmental education.
- Provide educational resources to address urban/rural interface issues.
- Provide education to conserve and protect Virginia's surface and groundwater resources, including the Chesapeake Bay.
- Develop and deliver programs in green energy/bioenergy.

Focus Area III: Creating a Positive Future Through 4-H Youth Development

- Improve competencies of Virginia youth in the following life skills: knowledge, reasoning, creativity, personal, social, vocational, citizenship, health, and physical.
- Develop supporting environments for 4-H youth development.
- Design volunteer development systems that attract, retain, train, and energize youth and adult volunteers who are progressive and have an enduring commitment to youth.

Focus Area IV: Strengthening Virginia Families and Communities

- Improve the health of Virginians through access to adequate, safe, and nutritious food.
- Develop and deliver educational programs to increase the understanding and development of the social, cognitive, and physical capacities of Virginians.
- Increase economic stability and decrease reliance on public services by improving youth and family financial literacy and security.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
7409653	2437898	5283843	2866240

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	8668678	3016444	4135441	2150698
Actual Matching	12957633	3016444	9089176	2209222
Actual All Other	25237894	825192	56990669	1190331
Total Actual Expended	46864205	6858080	70215286	5550251

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

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Agriculture Profitability and Sustainability
2	Biotechnology, Biomaterials, and Energy
3	Community Viability
4	Food, Nutrition, and Health
5	Natural Resources, Environment, and Climate Change
6	Strengthening Virginia Families
7	Youth Development

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Agriculture Profitability and Sustainability

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%	0%	10%	0%
111	Conservation and Efficient Use of Water	8%	0%	0%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	1%	0%	10%	5%
202	Plant Genetic Resources	3%	0%	10%	15%
204	Plant Product Quality and Utility (Preharvest)	10%	0%	0%	20%
205	Plant Management Systems	16%	20%	10%	10%
206	Basic Plant Biology	0%	0%	5%	0%
211	Insects, Mites, and Other Arthropods Affecting Plants	5%	0%	5%	0%
212	Diseases and Nematodes Affecting Plants	0%	0%	5%	0%
215	Biological Control of Pests Affecting Plants	1%	0%	0%	5%
216	Integrated Pest Management Systems	13%	0%	13%	0%
301	Reproductive Performance of Animals	4%	0%	5%	15%
302	Nutrient Utilization in Animals	3%	0%	5%	15%
307	Animal Management Systems	7%	10%	5%	15%
311	Animal Diseases	5%	10%	2%	0%
315	Animal Welfare/Well-Being and Protection	8%	0%	0%	0%
601	Economics of Agricultural Production and Farm Management	5%	50%	5%	0%
604	Marketing and Distribution Practices	0%	10%	0%	0%
606	International Trade and Development Economics	1%	0%	10%	0%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	120.9	15.0	168.6	9.5
Actual Paid	124.6	15.0	209.0	7.5
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
3084049	1446166	2748706	1725276
1862 Matching	1890 Matching	1862 Matching	1890 Matching
4609927	1446166	6041309	1591687
1862 All Other	1890 All Other	1862 All Other	1890 All Other
8978866	388596	37880026	775010

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research experiments that educate and solve applied problems; establish partnerships to identify needs and develop solutions; conduct workshops, both traditional procedures and hands-on, and meetings to provide training for farmers and educators; organize and conduct state and regional conferences; establish on-farm demonstrations; develop enterprise budgets; develop products, curriculum, and resources for use by educators and directly by producers; and conduct assessments as needed to evaluate progress. Research-based information will be disseminated via media and informational meetings. Decision aids, workshops, detailed curriculum, and distance educational methods will be used to support change in the overall behavior of learners.

2. Brief description of the target audience

Commercial producers, 4-H youth, Master Gardeners, state and federal agency personnel, Extension educators, consumers, supermarket chain store buyers, animal owners, youth, allied industry personnel, policy-makers, academic colleagues, research scientists, government officials, high school teachers, general public, individuals, families, owners and managers of farms, and small businesses; local, state, and federal personnel, private sector service suppliers, advocacy and consumer protection groups and association, health/medical personnel.

3. How was eXtension used?

Specialists and agents participated in multiple communities of practice (COP), including Corn and Soybean. Information is shared and supported by involved in several COP's. For example, Animal Welfare, Apples, Bee Health, Beef Cattle, Community, Local and Regional Food Systems, Corn and Soybean Production, DAIReXNET, FReSH - Farm Safety and Health, Goat Industry, Invasive Species, Pesticide Environmental Stewardship, Precision Agriculture, Sheep, Sustainable Ag Energy, Water Conservation for lawn and Landscape, and Youth Agriculture.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	393752	1014665	100159	24573

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	378	443	821

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of publications created.

Year	Actual
2015	1718

Output #2

Output Measure

- Number of Extension presentations delivered.

Year	Actual
2015	2698

Output #3

Output Measure

- Number of peer-reviewed journal articles published.

Year	Actual
2015	167

Output #4

Output Measure

- The amount of competitive grant funding received.

Year	Actual
2015	18531465

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Dollars saved through implementation of IPM practices over the last 5 years
2	Producers implement practices for quality assurance certification.
3	Adoption of BMPs results in greater profitability
4	Producers benefit from crop breeding programs
5	Direct marketing education improves long term sustainability of Virginia small farms
6	Virginia aquaculture producers improve profitability through enhanced disease management and productions techniques
7	Sorghum research seeks to reduce the need for imported grain for the swine industry
8	Researchers work to develop a Staphylococcus aureus vaccine that will protect cows against a common bacterial infection that leads to mastitis and reduced milk production.
9	Edamame research explores suitability of new cash crop for Soutside Virginia
10	Researchers explore native bee potential for orchard pollination
11	Exploring the viability of Hops as a viable Virginia crop
12	High value specialty crops increase small farm profitability
13	Limited resource farmers in Virginia diversify and profit through VSU Small Farm Outreach Program efforts
14	Incorporating Brown Mid-Rib (BMR) Sorghum Species into Grazing Systems
15	Development of Disease Resistant Soybean Cultivars
16	Development of adapted hard red winter (HRW) wheat varieties
17	Developing in-depth agricultural trade and policy information and analysis for increased competitiveness

18	Evaluating pre-plant soil disinfestation tools for pest control in annual plasticulture strawberry production
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Outcome #1

1. Outcome Measures

Dollars saved through implementation of IPM practices over the last 5 years

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
2015	600600

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Fruit crops are a knowledge-intensive, high value set of crops. Virginia ranks 6th in the nation in apple production with a crop valued at over \$68 million; and 20th in peach production (crop valued at \$4.5 million). Cherries, pears, and plums are also produced in Virginia (2013 data). In the modern economic and extension climate, it is more difficult to visit individual farmers. The importance of a long-standing series of orchard fruit schools has therefore grown.

What has been done

Faculty involved in tree fruit industries participate in a week-long series of full day fruit schools in February. Technical issues are presented in a venue that encourages participation from fruit producers, both in the form of questions as well as contribution of ideas. VCE agents are central to the planning of these fruit schools, both in terms of logistics and organizing stakeholder input in program development.

Results

Growers that account for most of the tree fruit production acreage take part in these fruit schools. This venue is used to provide pesticide applicator recertification credits. With two-way information transfer, information to formulate future research and extension efforts is garnered by specialists.

A recent survey (<https://pubs.ext.vt.edu/AREC/AREC-135/AREC-135.html>) of fruit producers and crop advisors indicated that: 95.1% of survey respondents have used information from fruit

schools to help guide their application of pesticides. 98.0% of survey respondents reported that the fruit schools had been helpful or extremely helpful in improving their ability to manage pest problems. Several growers noted that they were now rotating insecticide classes to reduce resistance; or were using different pesticides, including mating disruption; or had lowered the rates used. Of the 74 participants who answered the question, "How has using the information from Fruit Schools affected the profitability of your operation (or the operations of the growers you consult with)?", 34 (45.9%) reported an increase, 39 (52.7%) reported no change, and only 1 (1.4%) reported a decrease in profitability. Thirteen growers estimated their yearly increase in profitability based on using the information from fruit schools. These estimates ranged from \$300 to \$200,000. The total of these 13 estimates was \$600,600.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

Outcome #2

1. Outcome Measures

Producers implement practices for quality assurance certification.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	6000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

U.S. consumers are very concerned about the safety and wholesomeness of the food they eat. This safety and wholesomeness is tied to production and management decisions made on the farm, and consequently for beef to be competitive with other food choices producers must make choices at the farm level based on scientific knowledge and a commitment to produce a quality product.

What has been done

Through formal training involving Extension specialists, agents, and industry partners the Virginia Beef Quality Assurance Program (BQA) educates and certifies beef producers in best management practices that improve the safety and quality of beef. Extramural funding was secured to carry out the training efforts from the Virginia Beef Industry Council.

Results

The total number of certified producers in Virginia stands at over 6000 which makes Virginia one of the national leaders in BQA activities. During 2015 there were 746 producers either certified or re-certified. These producers came from 69 counties and four surrounding states. We estimate that the certified producers represent over half of the cattle produced in Virginia. Added value of cattle produced on BQA certified farms is estimated to be \$1.5-2.0 million annually.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
307	Animal Management Systems
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #3

1. Outcome Measures

Adoption of BMPs results in greater profitability

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
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Many agricultural producers rely on cover crops in their growing systems to improve soil health through nutrient holding, erosion control, addition of organic matter and nutrients, and compaction reduction. Many producers are unaware of the benefits of multi species cover cropping, and the programs that are available to producers who implement a multi species cover crop in their system through the Natural Resources Conservation Service (NRCS) and the Northern Neck Soil and Water Conservation District (NNSWCD).

What has been done

VCE in Northumberland, Lancaster, Westmoreland, Richmond, and Essex Counties partnered with local NRCS offices, and the NNSWCD to offer the 2015 Farmer to Farmer Cover Crops Conference to 80 local producers. Participants were provided with information regarding Soil and Water District and NRCS cover crop financial assistance requirements; and had the opportunity to participate in a discussion forum covering multi species cover cropping best management practices to achieve high biomass cover crop stands.

Results

Thirty-one attendees returned evaluations following the conference. Evaluations reported that prior to the conference these producers represented 4,861 cover crop acres within the Northern Neck and surrounding area. 75% of those evaluated planned to increase the acreage they plant in cover in the coming season. 46% of producers reported that they had never implemented the use of a multi species cover crop prior to the conference, 43% of these producers indicated that they planned to implement a multi species cover crop in the coming season after attending the conference. 100% of attendees reported that they increased their knowledge on best management practices when cover cropping due to their attendance. In evaluation many attendees commented that they planned to transform their current monoculture cover cropping system to include multi species cover crops. Producers also indicated numerous management practices suggested during the conference that they planned to implement in the coming season in order to produce a higher biomass cover crop.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
205	Plant Management Systems

Outcome #4

1. Outcome Measures

Producers benefit from crop breeding programs

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
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Corn production is very important to both the general Virginia economy and the Virginia agricultural economy. According to a press release from the Virginia Department of Agriculture and Consumer Services released, Virginia farmers were expected to harvest almost 50 million bushels of corn (average yield of 160 bushels per acre) from 310,000 acres during 2015. Using a cash price of \$3.75 per bushel, the value of the 2015 corn crop is estimated to be about \$188 million. Hybrid selection is one of the most important aspects of corn production and at least 14 seed companies are currently marketing several hybrids each in Virginia. Farmers need non-biased, research-based information to help them select the best yield hybrids with the proper traits.

What has been done

For 24 years, VCE agents in eastern and central Virginia, with financial support from the Virginia Corn Board and seed companies, have cooperated with local farmers to conduct on-farm corn hybrid demonstration plots. These annual tests are larger than traditional research plots and are planted, maintained, and harvested by the farmer with farmer-owned equipment. In 2015, tests were replicated across six locations in eastern Virginia. Results were published in the VCE publication, "2015 Virginia On-Farm Corn Test Plots." The publication is distributed via electronic and hard copy formats to farmers and crop advisors throughout Virginia. In addition, the plots are often used as part of extension field days, and the information is presented to hundreds of Virginia farmers at local VCE meetings and conferences. Direct and in-kind funding for these efforts provided by the Virginia Corn Board and the seed companies was over \$20,000.

Results

Variability in corn yield was confirmed with the on-farm corn test plots and documented in a VCE publication. Hybrid selection information was distributed to farmer, seed company representatives, and crop advisors throughout Virginia and the Mid-Atlantic. The test plot results indicated that yield variability averaged across multiple locations for early, mid, and full season hybrids was 43%, 9%, and 16%, respectively for an average of 23%. This would be a value of \$138 per acre given an average yield of 160 bushels per acre and corn priced at \$3.75 per bushel.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
205	Plant Management Systems

Outcome #5

1. Outcome Measures

Direct marketing education improves long term sustainability of Virginia small farms

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Increasing consumer demand for local foods in Virginia has opened direct market outlet opportunities for new and existing extension clientele in the form of online sales, farmer's markets, CSAs, food hubs, and value added products. New ANR field agents may not be skilled in training county based clientele in marketing and business topics and may need mentoring support to build confidence in developing effective county based programs serving the marketing and business educational needs of clientele interested in profiting from local foods market opportunities.

What has been done

The VSU Cooperative Extension marketing and agribusiness program developed a VSU extension specialist-agent mentor and training program in the expertise area of marketing and agribusiness. The agent mentor program responds directly to local marketing and business issues identified by new ANR agents, with a goal to equip agents with the skills and resources they need to independently train their and clientele seeking education on marketing their products or improving their business skills.

Results

In the 2015 fiscal year, the VSU CE marketing and agribusiness program has provided direct training and mentoring to five new VCE field agents, and together, we have successfully educated 423 of their clientele in farmer's market display (146 improved their farmers market stands), creating farm websites (23 created a new farm webpage), writing marketing plans (29 implemented a marketing plan), and value added product marketing (3 began to produce and sell value added farm products). The potential impact of this program is that through institutional teamwork, VCE clientele profitability is greatly increased through the empowerment of new VCE extension agents in the educational outreach areas of farm marketing and business

programming.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #6

1. Outcome Measures

Virginia aquaculture producers improve profitability through enhanced disease management and productions techniques

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In order for fish farmers to sell live fish, many states are requiring a fish health certificate showing that fish have been inspected for specific pathogens. Farmers must find a fish health laboratory capable of performing these tests. These labs can be quite costly and can result in reduced profits for farmers.

What has been done

VSU Fish Health Diagnostic Laboratory is assisting producers in the certification process. Many of the pathogens that are bacterial and parasitic requires testing, and it is being done at no cost to the producers as an outreach service to limited resource fish farmers. VSU Fish lab started doing virology testing in 2010. This further reduces cost to the farmer as much as \$1,500 to \$2,500. The VSU lab provides diagnostic information to VDACS Veterinary Services for issuing a letter of certificate when required by the importing state.

Results

The VSU Fish Health Diagnostic Laboratory has assisted Virginia fish farmers in obtaining fish health certificates in order to ship live fish to other states for stocking. The testing required for the fish health certificate may cost farmers up to \$2,500. Since 2012, VSU has saved participating fish farmers up to \$30,000 in diagnostic costs. By removing lab testing expense, the VSU Fish

Health Diagnostic Laboratory has assisted limited resource fish farmers to access additional lucrative local and international markets that were once closed to them.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
311	Animal Diseases

Outcome #7

1. Outcome Measures

Sorghum research seeks to reduce the need for imported grain for the swine industry

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Mid-Atlantic hog and poultry industry is seeking alternative and improved feed to retain their competitiveness in the market place. Currently, a majority of feed is imported from Midwest States or overseas, which comes at a significant transportation cost. Therefore, all local feed options are being considered. Corn cannot make up for the demand as there are few regions in the Mid-Atlantic where the environment is ideal for consistent corn production. Grain sorghum is more tolerant to drought than corn, can be grown on marginal land with less inputs than corn, it is a good rotation crop for soybean and peanut, two major legumes grown in the V-C region, and can be grown as a double crop after winter wheat. Therefore, grain sorghum is currently being explored as a reliable, local source of feed grain, but current commercial hybrids have been developed for the high plains region of Texas through Kansas and the performance of these varieties is not optimal for the Mid-Atlantic region. Over the past two years, Smithfield Murphy Brown has worked closely with NC State, Virginia Tech, and Clemson University to develop the regional "Feed Grains Initiative". As part of this initiative, a multi-state official variety testing program (OVT) has been established in 2013.

What has been done

Even though the official variety testing program (OVT) has been established in 2013, sorghum hybrid comparison tests were performed from 2009 through 2012 at several locations in VA, NC, and SC. In 2014 new test locations in Maryland were added. I personally conducted replicated variety trials at multiple locations in VA, at research stations and also in farmer's fields, for yield and other agronomic characteristics such as yield and disease; disease data on these trials were collected by plant pathologist. Since 2009, several grower's meetings and field days were organized based on these trials, directed towards identification of the best adapted grain sorghum hybrids for the Mid-Atlantic region. In 2012 we become part of a consortium to improve grain sorghum production for the Mid-Atlantic region, and in 2013, the Official Variety Testing in the Mid-Atlantic Animal Feed Grain (OVT-MAAFG) project was coordinated by the North Carolina Biotechnology Center. Collaborators in this multi-state effort are University of Maryland, Virginia Tech, North Carolina State University, and Clemson University.

Results

VCE has extended sorghum production information, as well as sorghum research results, through several extension publications, three of which are now a reference for hybrid selection by farmers in the Virginia-Carolina region. In 2015, grain sorghum acreage in Virginia increased from 9,000 acres in 2014 to 12,000 acres.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
202	Plant Genetic Resources
205	Plant Management Systems

Outcome #8

1. Outcome Measures

Researchers work to develop a Staphylococcus aureus vaccine that will protect cows against a common bacterial infection that leads to mastitis and reduced milk production.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The identification of mechanisms by which Staphylococcus aureus (S. aureus) evades host immune responses and enhancement of natural host immunity is valuable for developing vaccines. S. aureus causes severe infections in both humans and agricultural animals. Costs attributed to bacterial mastitis exceed 2 billion dollars annually in lost product, veterinary bills, and animal loss. Identification of key bacterial antigens that enable development of long term memory and therefore protection from infection is the first step in development of an effective vaccine against Staphylococcal infections such as mastitis.

What has been done

We are expanding on the knowledge of how these key immune stimulating cells respond during staphylococcal infection with funding from AFRI/NIFA. We are identifying the S. aureus specific host immune cells that protect against infection. We are processing data and following animal immune development and responses.

Results

The search for a vaccine against S. aureus is an ongoing mission that would benefit humans and animals alike. Our research has successfully identified the presence of S. aureus specific long term memory (Memory T cells) in the circulation of animals in the Virginia Tech dairy herd. We are in the process of identifying the specific bacterial component (S. aureus antigen) that enhances development of these memory cells. Understanding why there is a lack of immune memory that prevents bacterial infections in the mammary gland will allow for development of a vaccine that can overcome these problems.

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #9

1. Outcome Measures

Edamame research explores suitability of new cash crop for Soutside Virginia

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia agribusinesses are encountering challenges that farmers in southern regions have experienced loss of income and cropland since the end of federal tobacco price support program. Edamame and/specialty soybeans are regarded as a profitable substitute of tobacco or add-on crop since they can be grown as a commodity crop similar to general-purpose soybean but have higher market values if harvested for vegetable diets of fresh beans and/or for soy-based food products of mature beans, especially for organic foods. As more people have become aware of the nutritional and health benefits of soy food, the demand of edamame and food-grade soybeans has been significantly increased, thus bringing a promising opportunity to increase farmers' income. In addition, growing of vegetable and specialty soybeans also helps the diversification of both rural and urban agriculture as well as food supply. The edamame/specialty crops breeding program and scientists at VSU Agricultural Research Station are dedicated to development of new varieties of edamame and/or food-grade specialty soybeans, which are particularly suitable for Virginia and USA in general.

What has been done

Genetic improvement of varieties is a crucial technology and strategy for progress in agricultural development and food security. It is also the most cost-effective and environmental-friendly solution to increasing crop yield and enhancing the end-use quality. Using traditional breeding methodologies and modern techniques, the project aims to develop new superior lines and/or varieties of conventional (non-GMO) soybeans with high yield potential, improved quality traits and good adaptability to Virginia and mid-Atlantic environmental conditions. The lines/varieties developed can be grown in crop production as a supplement to GMO soybeans and/or a value-added alternative for food uses, thus directly benefiting Virginia soybean growers. In addition, the genetic foundation and potential of GMO soybeans in yield and other traits are based on and depend on the genetic features and superiority of conventional germplasm or cultivars as the parents. Lack of excellent conventional varieties/germplasm lines contributed to the parentages will greatly hinder the progress in developing superior GMO cultivars. Thus the lines/varieties developed by the project can also be used as parents in breeding programs for both public and private sectors to develop new cultivars (including GMO beans) fitting different purposes and needs, thus helping further progress in soybean research and production and indirectly benefiting Virginia soybean industry.

Results

VSU has established a vegetable soybean (edamame) research program and released three varieties, Asmara, Owens, and Randolph. To facilitate the application or use of these varieties, scientists at VSU have investigated agronomic practices to expand the window for harvesting fresh beans. Hundreds of breeding lines are also being evaluated for agronomic performance, yield potential and nutrients.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
205	Plant Management Systems

Outcome #10

1. Outcome Measures

Researchers explore native bee potential for orchard pollination

2. Associated Institution Types

- 1862 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A 1996 study from Cornell University estimated that the value of honeybee pollination to agricultural crops in the United States is approximately \$14.6 billion dollars. Over the last decade there has been an avalanche of concern about the decline of honey bees and the impact that a loss of these pollinators will have on agricultural productivity. However, fruit pollination studies have shown that honeybees often do not constitute a majority of the flower visitations that ensure adequate fruit set of fruits and vegetables. New Jersey and Pennsylvania have shown that some orchards have over 90% of the flowers fertilized by bees other than honeybees. There are 458 species of bees in eastern USA with over 100 species known to pollinate orchards. Given the lack of honeybee colonies available for pollination and the logistical concerns of hive placement and removal in a heavily sprayed environment, an investigation of what be done to support native pollinators is extremely timely. The local abundance of native bees known to pollinate food crops in eastern United States has been enhanced by volunteers deploying hollow cardboard tubes as nesting sites in diverse landscapes in the area, thereby augmenting natural nest sites for mason and leaf cutter bees.

What has been done

Over thirty sites were monitored in 2015 by distributing nesting tubes to Master Gardener volunteers, Master Naturalists, local beekeepers, and the general public at the Nelson County Farmers Markets. These volunteers have agreed to place these bundles of tubes along field borders and roads. The tubes will be left out doors for two seasons after which the number of tubes colonized will be tabulated with additional information gathered relating tube success to bee species, habitat, and proximity to applied pesticides.

Results

Extension volunteers assembled additional 250 tubes for distribution next year. Initial reports by volunteers indicate that the tubes used are successful in attracting mason and leaf cutter bees. There is great interest to determine if a created wildflower meadows have any beneficial impact on these important members of the native bee population. Extension volunteers have established three demonstration plots to demonstrate the benefits of such landscapes over manicured lawn. Henceforth the number of deployed tubes will be increased. The Virginia department of Transportation has shown interest in extending this study along the area's highways as HR 2738, the Highways Bettering the Economy and Environment Protection Act (aka Highways BEE Act).

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #11

1. Outcome Measures

Exploring the viability of Hops as a viable Virginia crop

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is increasing interest in hops as a potential alternative crop in Virginia because of the rapid growth of the craft beer sector both within the Commonwealth. The passage in 2012 of legislation SB604 (also known as the tasting room bill) that allowed breweries to sell their products for on-site consumption has resulted in a doubling of craft breweries in the state and along with the opportunity for Virginia farmers to supply ingredients including hops. Currently, a few Virginia growers with 0.25-0.5 acres of hops (mostly Cascade) are selling wet hops to local breweries at \$15/lb. and the opportunity exists to expand both acreage and product diversity through research and outreach.

What has been done

The major hops growing region in the US is the Pacific Northwest with a drier and milder climate relative to the mid-Atlantic. This means managing pests, diseases, and other stressors will be a big challenge for farmers in Virginia and the region. Research work needs to be conducted to identify hops cultivars more adapted to the region, sustainable approaches for pest and disease control, and to develop recommendations for key agronomic practices. In the medium term, the need will arise for postharvest handling and processing solutions optimized for Virginia conditions. Currently, the Alternative Crops program is pursuing funding and collaborations that will address all these issues in the next 3-5 years.

Results

With support from the Virginia Department of Agriculture and Consumer Services (VDACS) Virginia State University has constructed a 1-acre research and demonstration hop yard. Field planting of 35 varieties to test performance under Virginia conditions has been completed. Additionally, the Alternative Crops program at VSU has entered into collaborative arrangements with NCSU and VT to share ideas and leverage resources available for establishing research and extension support for hops in the region.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #12

1. Outcome Measures

High value specialty crops increase small farm profitability

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small farmers in Virginia are increasingly turning to direct to consumer markets (farmers market, Community Supported Agriculture, and on-farm sales) to sell their products. Direct to consumer markets demand unique crops that are interesting and even considered beneficial for health. Ginger and turmeric are of high interest to consumers and are medically proven to reduce inflammation and improve blood pressure. Berry crops, ginger and turmeric are high value specialty crops that may increase small farm profitability in Virginia. Small farmers and consumers in Virginia are seeking information on how to grow, sell, and use small fruit crops, ginger and turmeric.

What has been done

To address the need for additional information on the production, marketing and culinary use of ginger and turmeric, Virginia State University Small Fruits and Vegetable unit (VSU SFVU) conducted a statewide Ginger and Turmeric production, marketing, and culinary workshop inviting health professionals and other experts to present current knowledge in the areas of growing, marketing, cooking, and health benefits. Throughout the year, VSU SFVU provided interested small growers with ginger and turmeric plants to grow and test market in Virginia local markets. In addition, several research projects were conducted to identify high yielding strawberry, blackberry, raspberry, and blueberry varieties to be shared with interested growers. An annual educational conference, 'Virginia Berry Production and Marketing Conference' was established to provide educational training to interested growers. Additionally, two annual field-days provided hands-on learning to small farmers.

Results

In 2015, to increase awareness of growing and selling ginger and turmeric in Virginia, the VSU Small Fruits and Vegetable Program conducted a statewide Ginger and Turmeric production, marketing, and culinary workshop attended by over 150 interested growers and other individuals. Additionally, this VSU program grew and distributed 300 ginger plants and 100 turmeric plants to interested small farmers to grow and sell in local markets. The marketable yield for ginger was 2,100 pounds; for turmeric 300 pounds. The participating growers sold their ginger for \$7 per pound, and turmeric for \$10 per pound, with an estimated total value of \$14,700 (ginger) and \$3000 (turmeric) earned by local small farmers. As the result of small fruit research and extension efforts, growers who collaborated with this project in 2015 generated a total of \$106,653.00 sales of different berries in different markets. A total of 55 seasonal job was created in different communities where this project was implemented.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
604	Marketing and Distribution Practices

Outcome #13

1. Outcome Measures

Limited resource farmers in Virginia diversify and profit through VSU Small Farm Outreach Program efforts

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	87

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Traditionally, the major crops produced by small, limited-resource, and socially disadvantaged farmers in Virginia are tobacco, cotton, and peanuts. With the advent of tobacco buy-out, increasing production cost, and shrinking farm incomes from these traditional crops, most of the farmers are unable to sustain their farm businesses, and some even lose their farms due to foreclosures. This vicious cycle of high production costs, and unprofitable and unsustainable traditional production practices, provide evidence for the need to transition these producers to the production of high value and profitable and sustainable alternative crops/livestock.

What has been done

In an on-going effort to improve the quality of life of small, limited-resource, and socially disadvantaged farmers and ranchers in Virginia, Virginia State University (VSU)-Small Farm Outreach Program plans and conducts a holistic program (planning, production, and marketing) to equip them with the information and skills needed to plan, produce, and market high value alternative crops/livestock. In addition to one-on-one farm/home visits, strategies used to conduct activities are, but not limited to, workshops, field days, hands-on demonstrations, conferences, farm and market tours, and group meetings.

Results

As a result of VSU Small Farm Outreach Program education efforts, 87 limited resource farmers transitioned to the production of alternative crops and livestock 2015; and 58% reported at least 15% increase in farm incomes from previous year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #14

1. Outcome Measures

Incorporating Brown Mid-Rib (BMR) Sorghum Species into Grazing Systems

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Cool-season forages are productive in the spring and fall, but high temperatures and drought often limit summer growth. The sorghum species, which includes sudangrass, forage sorghum, and sorghum x sudangrass hybrids grow well at high temperatures and have increased tolerance to short-term drought stress. Recent breeding efforts have resulted in the development of sorghum species containing the brown mid-rib trait (BMR) that lowers lignin levels and enhances digestibility. Past recommendations for selecting summer annual grasses have been to select locally available varieties and focus on management. While good agronomic and grazing management is important for maximizing returns from summer annuals, identifying and selecting cultivars with increased yield and digestibility is becoming increasingly important.

What has been done

Cultivars of sudangrass, forage sorghum, and sorghum x sudangrass hybrids have been evaluated for both yield and digestibility at Virginia Tech's Southern Piedmont Agricultural Research and Extension Center located near Blackstone, VA. Results from these trials have been disseminated to producers and agricultural professionals across the country at various conferences and meetings. Most recently these results were summarized over a five-year period and presented to a national audience at the American Forage and Grassland Council's Warm-Season Grass Workshop held in Lexington, KY.

Results

The use of BMR sorghum species has been steadily increasing not only in Virginia and the Mid-Atlantic Region, but across the country. Progressive producers have incorporated these species into grazing systems for both beef and dairy cattle. The use on BMR species has resulted in higher average daily gains and milk production during the summer months. Research at Virginia Tech's Southern Piedmont Agricultural Research and Extension Center has identified cultivars

that possess both above average yield and digestibility over multiple years. These cultivars are being recommended by agricultural professionals and used by producers throughout the Mid-Atlantic Region.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships

Outcome #15

1. Outcome Measures

Development of Disease Resistant Soybean Cultivars

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Worldwide loss due to pathogens on all major crops is estimated to be in tens of billions of dollars annually. In the United States for soybeans, annual loss due to stem and root rot disease (caused by *Phytophthora sojae*) alone is estimated to be several hundred millions of dollars. Occurrence of soybean mosaic virus disease results in further yield reduction in soybean fields annually.

What has been done

Development of resistant crop plants is the most practical and environment-friendly solution for addressing disease problems. However, detailed information on inheritance, number and chromosomal locations of disease resistance genes is a prerequisite for efficient resistance breeding programs. Although conventional approaches have been successful in this arena, there are some limitations, especially in breeding for complex diseases that are controlled by several genes. The advent of molecular marker technologies along with new genome sequencing tools have provided opportunities for tagging genes controlling resistance to complex diseases. Using such technologies, Virginia Tech researchers are developing molecular "tags" for disease resistance genes for subsequent use in marker-assisted selection (MAS) programs to facilitate their incorporation into elite backgrounds and to accelerate development of high-yielding soybean cultivars resistant to multiple diseases.

Results

The Virginia Tech team has conducted extensive research studying soybean resistance to Phytophthora and virus diseases. We have identified three different genes conferring resistance to soybean mosaic virus and developed DNA markers to facilitate their incorporation into high-yielding soybean cultivars. Our team and collaborators have developed a novel protocol to screen soybean germplasm for Phytophthora resistance. This novel approach has identified several soybean lines containing potentially new resistance genes. Work is in progress to develop breeder-friendly DNA markers for these new and durable resistance genes. Such markers should further enhance the usefulness of the new Phytophthora resistance genes to the soybean breeding community by facilitating their incorporation with genes conferring resistance to viruses and other soybean diseases.

4. Associated Knowledge Areas

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

Outcome #16

1. Outcome Measures

Development of adapted hard red winter (HRW) wheat varieties

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Over 55 million people live in the Mid-Atlantic region of the U.S. Most flour mills in this region utilize both the traditionally grown SRW wheat as well as HRW wheat that has to be imported from the Great Plains regions of the U.S. or Canada. About one third of wheat milled in the eastern U.S. is HRW wheat.

What has been done

Hard red winter wheat cultivars recently released by the Virginia Tech small grains program, including Vision 45, LCS Wizard, and LCS Compass are targeted at meeting the needs of new markets in the eastern U.S. and Canada as well as in existing markets in the southern Great

Plains.

Results

The mills in the Mid-Atlantic region can utilize 2,900,000 tons of wheat per year. Because a significant market exists for HRW wheat in the eastern U.S., production of this specialty wheat in the eastern U.S. will provide producers and end-users with a significant economic advantage as grain of HRW wheat is usually of higher value than SRW wheat (\$0.40 per bushel or more) and currently must be imported over long distances to the region. Development of such specialty wheat varieties and management protocols is facilitating the production of higher value crops and new markets in the eastern U.S. In 2015, Virginia Tech released a hard red winter (HRW) wheat variety that will be marketed as LCS Compass. This variety is well adapted to the northern Great Plains regions of South Dakota and Nebraska and provides growers in those regions with a variety that is short in stature, early to mid-season maturity, and has high yields and excellent milling and baking quality.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources

Outcome #17

1. Outcome Measures

Developing in-depth agricultural trade and policy information and analysis for increased competitiveness

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2014, Virginia set another record for agriculture and forestry exports with a total value of \$3.35 billion. This figure represents a 14 percent increase over the 2013 record of \$2.9 billion? (VDACS, 2015). International trade in agricultural and forestry products from Virginia continues to be a key driver of economic prosperity for the Commonwealth. In the future, the state's largest industry will continue to depend on international trade as an important market outlet enabling economic

growth. This global market place requires new skills of students as they enter the job force and industry professionals, both from knowledge-base of international trade and marketing as well as an appreciation of diverse cultures and backgrounds. At the same time it requires an innovative team of policy and research specialists to keep US and Virginia agriculture competitive in a diverse and dynamic global economy.

What has been done

To meet these challenges and facilitate economic growth, Virginia Tech College of Agriculture and Life Sciences has created the Center for Agricultural Trade to keep U.S. and Virginia agriculture competitive in a diverse global economy. The Center's vision is to become a national leader in the creation and dissemination of information and analysis for policymakers, academia, and commercial firms in the global marketplace for agricultural products. To achieve this vision, the Center has mission in education, research, and policy/outreach.

Results

Center researchers have developed a major research/policy partnership with the USDA Office of the Chief Economist. Development of large scale world dairy model (Grant and Peterson) to evaluate dairy product trade liberalization scenarios for US agriculture from participation in the Trans-Pacific Partnership (TPP) Negotiations. Virginia Tech CAT model was showcased alongside the USDA baseline model, the FAPRI model in two feature presentations to OCE and World Agricultural Outlook Board, Nov. 15-17, 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
606	International Trade and Development Economics

Outcome #18

1. Outcome Measures

Evaluating pre-plant soil disinfestation tools for pest control in annual plasticulture strawberry production

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The ban on methyl bromide:chloropicrin formulations as a fumigant for control of soil borne diseases and weeds has increased costs for managing strawberry fields. Lack of access to this fumigant is estimated to result in crop yield losses of 10 to 15% along with increased hand weeding costs.

What has been done

A study was initiated in fall 2014 at the Virginia Tech Hampton Roads Agricultural Experiment Station to evaluate mustard seed meal, corn gluten meal, and paper pellets mulch, and to evaluate reduced time periods of soil solarization with these pelleted products. Data were collected and analyzed pertaining to efficacy of treatments in providing weed control, and their effect on crop growth and marketable fruit yield. This study is being repeated in 2015-2016 growing season. Initial findings from the study were presented to the growers and allied industry members at the preplant strawberry meetings in July 2015.

Results

From the work done from 2013 through 2015, Virginia Tech researchers have identified that long term soil solarization provides effective weed control in strawberry production but it comes with challenges such as wet soil conditions that prevent initiation of soil solarization treatments in a timely manner, and planning 8 to 6 weeks ahead of time from the strawberry season. Efforts of reducing the time period of soil solarization (3-week period in case of our study) and integrating with pelleted products (enhanced soil solarization) may make it more practical treatment for growers to adopt. Over the two years, Virginia growers have gained a 60% increase in knowledge on soil solarization treatments. About 10% growers in state have indicated an interest in soil solarization practices. Our research strives to improve the performance of soil solarization by integrating with pelleted products. In 2014-15 growing season, although no weed activity was improved over untreated control, paper pellet mulch has shown to improve crop growth and yield.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

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

The gross income derived from farming could be affected by natural disasters, changes in the economy, government regulations and public policy changes. Disasters damage infrastructure and facilities while economic and governance changes influence profitability of production systems. The number of acres of land subject to nutrient management plans/best management practices/conservation plans affected by government regulations and changes in the economy. If greater emphasis is placed on water and environmental quality then even more widespread implementation of these practices will be encouraged. These factors may have immediate impact as they significantly influence items such as production economics, industry infrastructure, marketing systems, and consumer demand.

Good economic conditions encourage consumption of value added products. In Virginia, increasing land values in traditional animal production areas around cities and growing towns are a significant challenge. The recent increase in ethanol production and anticipated future growth of this alternative fuel source will likely have major impacts on livestock production practices in Virginia. Scope of such impacts is unknown, but anticipated direction has influenced this planned program.

A recent challenge has been the change in demographics in Virginia. There is an increased demand to offer education resources in Spanish. Employers have a desire to employ non-English speaking workers. The prohibitive, besides the lack of resources to change the training materials and examinations, is that most materials use in Virginia (and most states) are written in English only. Changes in global food production capacity, energy costs, and epidemic diseases could have unpredictable effects. All external factors affecting personal discretionary spending will affect the implementation of environmentally sound BMP's. Natural disasters may affect producers directly but also will affect ag producers, homeowner and commercial landscaping. The general economy, public policy and governmental regulations impact production and sales of horticultural products.

Appropriations and competing programmatic challenges affect the dedication of personnel and programs to the described programs. Population changes affect supply and demand for horticultural products.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The Virginia soybean crop is a target of new and emerging insect pests, including the brown marmorated stink bug and the kudzu bug. Infestations are sporadic, localized and difficult to predict. Fields are often infested before growers are aware insects are active in their locations, and can sustain high levels of crop injury before protective treatments can be applied. A statewide soybean survey was coordinated to provide clientele with up-to-date pest status information and management recommendations. Funding from several sources (the Virginia Soybean Board, the Virginia Agricultural Council, and USDA-NIFA) were used to fund the program. Two field scouts, one based in Southampton County and one in Fluvanna County, the entomology crew at the VT Tidewater AREC, and VCE Extension Agents scouted soybean fields across the state from late vegetative stages (mid-July) through crop maturity (mid-October). Scouts logged over 28,000 miles making 773 field visits to 66 Virginia counties. Observations were summarized weekly and posted on the Virginia Ag Pest and Crop Advisory blog site, and email delivered via MailChimp to 529 recipients across the state and region. BMSBs were found in soybean fields in 39 counties across Virginia, and kudzu bugs in 44 counties. However, although present, populations of both pests were very low and never reached treatable levels. A naturally occurring insect fungal disease, *Beauveria bassiana*, was found to be infecting large numbers of kudzu bug adults and nymphs. This is the first documentation of this beneficial 'natural enemy' of kudzu bug in Virginia and was a critical factor in reducing populations. Because of the low

pest pressure, as determined by the survey effort and conveyed to clientele in weekly advisories, total soybean acres treated with insecticides was very low compared to years when pest pressure was high.

Key Items of Evaluation

Invasive insect that was monitored and assessed for impact on a major crop. Used a IPM blog to show the results to clientele. Use of little known biological for control.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Biotechnology, Biomaterials, and 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
112	Watershed Protection and Management	20%	0%	15%	0%
124	Urban Forestry	5%	0%	0%	0%
132	Weather and Climate	5%	0%	0%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	20%	50%
202	Plant Genetic Resources	2%	0%	10%	0%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	10%	0%	5%	50%
206	Basic Plant Biology	5%	0%	5%	0%
402	Engineering Systems and Equipment	10%	0%	20%	0%
403	Waste Disposal, Recycling, and Reuse	11%	0%	0%	0%
511	New and Improved Non-Food Products and Processes	15%	0%	20%	0%
601	Economics of Agricultural Production and Farm Management	10%	0%	5%	0%
605	Natural Resource and Environmental Economics	7%	0%	0%	0%
	Total	100%	0%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	3.2	1.0	4.5	1.0
Actual Paid	3.3	0.0	9.4	1.0
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
138921	0	123816	71931
1862 Matching	1890 Matching	1862 Matching	1890 Matching
207654	0	272131	99343
1862 All Other	1890 All Other	1862 All Other	1890 All Other
404453	0	1706307	204057

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Sustainable Energy program includes laboratory research, development of pilot scale projects in the field, educating clientele on the merits of particular energy practices and conversion technologies, and engaging the private sector to spur the commercialization and economic development of innovative and efficient energy systems. Specific examples of activity areas of this program are listed below:

- * Develop biomass use for biofuels
 - * Designing optimum forestry and crops for bioenergy production.
 - * Produce value-added bio-based industrial products.
 - * Logistics/material handling
 - * Processing and management of end use waste products and byproducts
 - * Analysis of the global impacts of new generation biofuels
 - * Demonstration and commercialization of technologies that increase US energy independence
 - * Development of programs to train students and current county educators (in-service) to meet the new sustainable energy challenges.
 - * Energy conservation
 - * Alternative energy
 - * Understanding agricultural energy use and opportunities for conservation
 - * Smart and sustainable energy systems for communities
 - * Understanding the cost differences of energy usage
 - * Public outreach and engagement around energy public policy development
 - * Youth development programs to teach energy conservation, alternative energy sources, electricity and recycling.
- Clean energy project analysis via RETScreen

Processes of research studies, dissemination of research results, papers and citations, commercialization of techniques and products, conduct research experiments, conduct workshops, meetings, develop products, resources, work with media and establish and sustain partnerships.

2. Brief description of the target audience

- Farmers
- Citizens
- Agency personnel

- Economic developers
- Regional planners
- Commercial Producers
- Land Owners
- 4-H Youth
- K-12 Youth
- State and Federal Agency Personnel
- Extension Educators
- Policy Makers
- Consumers
- Ag Related Businesses
- Energy Service Companies (ESCOs)
- Research scientists, government officials, high school teachers, general public

3. How was eXtension used?

Information is shared and supported by involvement in several COP's. For example, Home Energy, Wood Products, and Sustainable Ag Energy.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	579	1540	141	0

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

Patent Applications Submitted

Year: 2015
 Actual: 3

Patents listed

- 1) Ice Nucleation Active bacterial molecule
- 2) Modular Design, System Architecture, and Enabling Software for Design and Control of a Bacteria-Guided Mobile Robot
- 3) A Novel and Advanced Nano Adjuvant for Vaccines Eliciting Antibody Responses.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	9	89	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational meetings, workshops, conferences, training sessions, demonstrations and field days

Year	Actual
2015	152

Output #2

Output Measure

- Number of fact sheets, publications, newsletters, and other print resources

Year	Actual
2015	108

Output #3

Output Measure

- Number of peer reviewed journal articles.

Year	Actual
2015	72

Output #4

Output Measure

- The amount of competitive grant funding received.

Year	Actual
2015	3916652

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase farm profitability due to more energy efficient practices
2	Increase adoption of sustainable energy conversion technologies
3	Increase program participants understanding of raw material conversion and modern business management practices.
4	Researchers develop novel switchgrass germplasm with higher biomass potentials, suitable for large scale and sustainable biomass production in Virginia
5	Researchers are developing better microbial systems for the production of bio-fuel, more effective therapeutics and vaccines for TB, and for facilitating better nutrient utilization in ruminants.
6	Suppression of SpKRP1 gene alters leaf shapes, delays flowering and increases biomass in <i>S. Pennellii</i>
7	Energy Efficiency Education Program helps low-income renters save money and energy
8	Characterization of Genes that Regulate Wood Formation and Biomass Accumulation
9	An improved process for monitoring transplantation organs: Assessment of ex vivo perfused liver health by Raman spectroscopy

Outcome #1

1. Outcome Measures

Increase farm profitability due to more energy efficient practices

2. Associated Institution Types

- 1862 Extension
- 1862 Research
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia farmers have tracked production expenses and realized the level of use and cost of fuel, oil, and electricity are continually increasing and are questioning how to design and implement efficient energy use plans. According to the 2012 National Agriculture Statistical Service (NASS) report, farm energy prices (including fuel, oil and electricity) increased approximately 19% from 2007 to 2011. It is estimated that across the 34 counties of Southside and Southwest Virginia, farmers spent more than \$66 million in farm energy related expenses during 2011 (NASS, 2007 & 2012). Using the 2011 expense estimate, a 10% increase in on-farm energy efficiency (realized without compromising output), would result in an additional \$6.6 million in income to farmers. Furthermore, the USDA Natural Resources Conservation Service (NRCS) reported that Virginia's demand for energy audits, as captured through CAP122 plans/contracts and 374 Farmstead Energy Improvement practice/contracts, increased over 560% between FY12 and FY13. Virginia Cooperative Extension and its partners launched the 2010-2012.

What has been done

On-Farm Energy Efficiency Pilot project with a \$248,842 grant and secured a second \$373,000 grant from the Virginia Tobacco Commission in 2014 to support farm energy efficiency in Southside and Southwest Virginia. The 2012 program identified over \$1 million in potential energy savings for 58 agricultural operations completing the energy audit process. These findings validated that farms were expending dollars on inefficient equipment and that farm profitability would increase when areas of energy loss were identified and efficient technologies were installed. The 2014-2016 project assists farmers in reducing the cost of operations and utilize appropriate technology; provides research guidance on technology and farm production; links farmers with the best practices, the knowledge experts, and funding opportunities; collaborates with federal and state agencies and energy companies to support Virginia agricultural

entrepreneurs to implement energy upgrades; and funds the audit expense and cost share for project implementation, and provides technical assistance to guide the farmer with interpreting the findings.

Results

The energy efficiency program addresses VCE focus area Enhancing the value of Virginia's agriculture, and provides a strategy to achieve Goal 1: increase the profitability and sustainability of Virginia's commercial food, fiber, animal recreation, and green industry. Because of this 2014-2016 funding, Virginia Cooperative Extension has reached its goal to provide 63 agricultural operations in Southside and Southwest Virginia access to and funding for energy audits and renewable feasibility studies, has supported program participants through a cost-share program for retrofit and/or renewable systems, and has delivered 17 educational programs on energy efficiency practices and technologies. Each operation received a \$5,000 energy account. During 2014-2015, 55 of the 63 operations have completed an energy audit, and 23 farms have used \$93,419 in grant funding along with over \$224,694 in individual funds to implement energy retrofits. Partnerships are in place with USDA Rural Development, Virginia Department of Mines, Minerals and Energy, Old Dominion Electric Cooperative, and other organizations to support this project.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

Increase adoption of sustainable energy conversion technologies

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The continuing growth of population and food consumption per capita means that the global demand for food could increase by 70% by 2050, while approximately 30% of the world's agricultural land and 70% of the world's fresh water withdrawals are being used for the production of food and feed to support seven billion people. To meet the world's future food and sustainability needs in biofuels and renewable materials, the production of starch-rich cereals and cellulose-rich bioenergy plants must grow substantially while minimizing agriculture's environmental footprint and conserving biodiversity.

What has been done

Virginia Tech researchers demonstrated a one-pot enzymatic conversion of pretreated biomass to starch through a non-natural synthetic enzymatic pathway, using enzymes originating from bacterium, fungus and plant sources. Up to 30% of the anhydroglucose units in cellulose were converted to starch; the remaining cellulose were hydrolyzed to glucose suitable for ethanol production by yeast in the same bioreactor. They continue to improve the process by decreasing production costs (e.g., use of commercial cellulase, increased cellulose digestibility, more efficient recycling of key enzymes) and producing both amylose and amylopectin, meeting different needs of food diets.

Results

Futurefood2050 highlighted this idea about new ways to produce new food. Next generation biorefineries based on simultaneous enzymatic biotransformation and microbial fermentation could address the food, biofuels, and environment trilemma. Non-food cellulose resource is approximately 40-fold that of starch produced from cultivated crops. Also, biomass crops can grow faster and require less inputs than cereal crops. The utilization of a small fraction of biomass (e.g., 20%) would be sufficient to feed the world and produce enough transportation fuels in the future.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
511	New and Improved Non-Food Products and Processes

Outcome #3

1. Outcome Measures

Increase program participants understanding of raw material conversion and modern business management practices.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Researchers develop novel switchgrass germplasm with higher biomass potentials, suitable for large scale and sustainable biomass production in Virginia

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Biofuels will need to be produced to help support the growing world demand for energy and fuel. In addition to being a renewable resource, using plants and eventually plant cellulose to produce ethanol and other products will also provide a carbon neutral solution to rising atmospheric carbon dioxide. It is very clear that the rising concentrations of carbon dioxide in the Earth's atmosphere are currently causing and will continue to cause global warming. Global warming only begins to describe some of the problems that will be associated with elevated atmospheric CO₂, however. Global warming will be associated with shifts in climate and weather patterns, and create an overall disturbance that will make prediction and management crops as well as the broader environment much more difficult.

What has been done

Virginia Tech researchers have been studying microbes in the root zone of switchgrass with a specific focus on associative nitrogen fixing bacteria. These bacteria share some traits with mutualistic relatives that live in the nodules of leguminous and actinorhizal plants. However, the impact that associative nitrogen fixers have in the root zone of plants and grasses is highly debated.

Results

Results suggest that grasses with relatively high productivity such as Alamo switchgrass can obtain up to 40% of their nitrogen through root zone nitrogen fixers. These estimates are anywhere from 4 to 8 times larger than previous estimates. Nitrogen fixation, broadly in soil ecosystems, may be more easily supported, especially in grasses, and provide greater rates of nitrogen fixation than expected up to date. The nitrogen budget of the earth has been difficult to accurately describe. In particular, nitrogen fixation at the global level has been estimated to be about 3X less than what was estimated 20 years ago. There is thus continuous turmoil over how

best understand the global nitrogen problem.

4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology

Outcome #5

1. Outcome Measures

Researchers are developing better microbial systems for the production of bio-fuel, more effective therapeutics and vaccines for TB, and for facilitating better nutrient utilization in ruminants.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Mycobacterium tuberculosis (TB) is the causative agent of tuberculosis (TB), a serious disease in humans and animals around the world. It is resistant to attack from the human immune system. There is very little understanding of how this organism retools its cells wall to avoid attack from human immune system?

What has been done

Virginia Tech researchers have obtained evidence to support the theory that M. tuberculosis sitting inside human granuloma (a low oxygen environment) employs a deazaflavin cofactor (F420) to build a complex cell wall that helps to avoid attack from human immune system.

Results

The deazaflavin cofactor-dependent cell wall synthesis enzymes could now be targeted for developing drugs for TB. In addition, these researchers have been able to convince a broad range of researchers that redox regulation of metabolism in anaerobes is an important component in biogeological/ecological processes and it has implications and applications in human health, nanoscience, bioremediation, biofuel production and chemical production research.

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes

Outcome #6

1. Outcome Measures

Suppression of SpKRP1 gene alters leaf shapes, delays flowering and increases biomass in *S. Pennellii*

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

S. pennellii is a wild relative of cultivated tomato (*S. lycopersicum*) native to arid regions of Peru. One factor facilitating survival in arid conditions is the secretion of 2,3,4 tri-O-acylated glucose esters (glucolipids) that coat the whole leaves. About 25% of energies are used by *S. pennellii* to synthesize these unique esters. Like glycolipids produced in oil crops, these glucolipids are potential biofuels and can be used for industry and transportation. However, the leaf biomass of *S. pennellii* is relatively less comparing to the cultivated tomatoes. Increasing leaf biomass would lead to more production of glucolipids, therefore, more bio-gasolines.

What has been done

Previous reports showed that inhibition of KRP1, a cyclin-dependent kinase inhibitor, could increase about 10-20% of leaf biomass in tomato and *Arabidopsis*. Scientist at Virginia State University conducted research on cloning and manipulating KRP1 gene in *S. pennellii*. We successfully cloned the homolog of tomato KRP1 (LeKRP1) gene from *S. pennellii* (designated as SpKRP1). SpKRP1 gene was inhibited by RNA interference (RNAi) technology in *S. pennellii* through *Agrobacteria* mediated transformation system. Transgenic lines carrying the RNAi construct altered leaf shapes and significantly delayed flowering time. Furthermore, leaf biomass analysis indicated that transgenic lines drastically increased leaf biomass production with ~28% more produced.

Results

This research demonstrated that manipulation of KRP1 gene in *S. pennellii* can increase biomass

production, and therefore produce more bio-gasoline for industry and transportation uses. Furthermore, our research may also provide a new strategy to improve biomass production in other crop species.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Energy Efficiency Education Program helps low-income renters save money and energy

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Many low-income apartment renters in Arlington frequently struggle with paying their rent and utilities. When they do they often turn to Arlington Thrive, a local nonprofit organization that provides emergency assistance. In 2010 this group approached the FCS agent requesting that they had become concerned over the high electric bills of many of their clients. Many people living in one- and two-bedroom apartments frequently came to them with electric bills over \$100. They feared that the culprit was poor energy efficiency in the apartments and wanted to know if there was anything that Extension could do to help. In Arlington and Alexandria's 2013 situation analysis the environment emerged as the number one priority issue.

What has been done

The FCS agent contacted Arlingtonians for a Clean Environment (ACE--another local nonprofit) and together VCE, ACE, and Arlington Thrive created a program that would involve training a corps of Energy Masters volunteers to provide weatherization services and energy efficiency education to low-income renters. In 2011 the groups applied for and received a \$25,000 grant from the Arlington Community Development Fund. In 2012, 2013, 2014, and 2015 they received consecutive grants of \$18,000 each. In 2015 118 trained volunteers completed retrofits in 58 apartments.

Results

To date Energy Masters volunteers have performed energy- and water-saving retrofits in 502 Arlington apartments. Volunteers have installed 560 faucet aerators, 250 low-flow showerheads, 279 toilet tumblers, 5,987 outlet gaskets, 258 power strips, and 3,148 compact fluorescent light bulbs. Thanks to additional funding and falling prices, LED lightbulbs are installed which last 70 times longer than incandescent (compared to ten times longer for CFLs). Initial data show that properties have saved an estimated 221,174 kilowatt hours of energy, 6,879,019 gallons of water, and \$101,555 in utility costs over the four years of the program. We have won three awards for this program: In 2014 the team received the national Extension Housing Outreach award from the National Extension Association of FCS. In 2013, they received two awards, a state program excellence award from VCE and a Green Giant award from Washingtonian Magazine. Impressed with the results of this program in Arlington, the Alexandria City government gave us a two-year grant of \$20,000 to expand the program to Alexandria.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
402	Engineering Systems and Equipment
511	New and Improved Non-Food Products and Processes
605	Natural Resource and Environmental Economics

Outcome #8

1. Outcome Measures

Characterization of Genes that Regulate Wood Formation and Biomass Accumulation

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The U.S. forest products industry employs over 1 million people and produces thousands of paper, fiberboard, lumber and engineered wood products. Xylem is the wood-forming tissue in plants and hence is the raw material for the forest products industry. It is the structure,

arrangement and relative proportions of the xylem cell types, that determine the physical properties of woods and hence their suitability for specific applications. Remarkably little is known about the regulation of most of the genetic mechanisms that regulate wood formation.

What has been done

uses Arabidopsis and poplar to study wood formation. Arabidopsis is a good choice for such studies because its genome has been fully sequenced and several unique resources have been developed for facilitating rapid characterization of genetic mechanisms. Poplar is a model for forest products research. Its genome has been sequenced. Virginia Tech researchers studied poplar protein-protein interactions and their integration into woody biomass signaling networks and the roles of sugar signaling genes in woody biomass production.

Results

Researchers have characterized Arabidopsis and poplar genes controlling a variety of activities that contribute to wood formation and overall biomass accumulation, including a gene that negatively regulates lignocellulose production and programmed cell death in xylem, genes that are putative components of a signaling pathway that regulates cell fate in the xylem, genes involved in novel protein-protein interaction networks relevant to wood formation, and genes that control the ability of plants to sense and partition carbon among various competing sinks. Results from these investigations can be incorporated into bioengineering and breeding strategies for manipulating economically important aspects of the structure of wood.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

An improved process for monitoring transplantation organs: Assessment of ex vivo perfused liver health by Raman spectroscopy

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

When organs are removed from a donor for transplantation into a patient, the organ has a limited lifetime before it is no longer transplantable. This becomes a significant problem for organs, such as the liver, that degrades quickly outside of the body. Upon receiving a liver for transplantation, the only data about its viability was a visual inspection by the transplanting surgeon.

What has been done

A Virginia Tech research team has developed a measurement technique using Raman spectroscopy that can monitor the health of the liver organ during an ex vivo (outside the body) perfusion method; the perfusion method is valuable for preserving the liver longer for transplantation. The spectroscopy measurement method acquires data in real-time and is inexpensive. We tested the method using porcine livers that were perfused ex vivo in the laboratory

Results

The team learned that different livers actually degrade at different rates and are sensitive to perfusion conditions such as temperature and fluid pressure. Using our measurement technique, we were able to determine degradation kinetics and identify toxins, amino acids, and fatty acids that are indicative of metabolic breakdown of the organ. Further studies will help refine the methods to characterize human organs in the future.

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes

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

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.)
The business income derived, acceptance of biotechnology, and energy usage could be

affected by natural disasters, changes in the economy, government regulations and public policy changes. The availability of federal and state grants and initiatives can be affected by government priorities and changes in the economy. If greater emphasis is placed on energy conservation and alternative energy sources are implemented, these practices and alternatives will be encouraged. These factors may have immediate impact as they significantly influence items such as production economics, industry infrastructure, marketing systems, and consumer demand. Good economic conditions encourage use of alternative energy sources and viable biotechnologies. In Virginia, increasing petroleum values in traditional businesses and logistics are a significant challenge. The recent increase in bioenergy and biotechnology production and anticipated future growth of this alternative fuel sources will likely have major impacts. Scope of such impacts is unknown, but anticipated direction has influenced this planned program.

Changes in energy production capacity, energy costs, and federal resources (grants & contracts) could have unpredictable effects. The general economy, public policy and governmental regulations impact production and sales of bioenergy and acceptance of biotechnology. Appropriations and competing programmatic challenges affect the dedication of personnel and programs to the described programs. Population changes affect supply and demand for alternative energy products.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Community Viability

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
602	Business Management, Finance, and Taxation	5%	0%	0%	0%
603	Market Economics	2%	0%	0%	0%
605	Natural Resource and Environmental Economics	10%	0%	15%	0%
607	Consumer Economics	5%	0%	10%	0%
608	Community Resource Planning and Development	70%	100%	75%	0%
610	Domestic Policy Analysis	3%	0%	0%	0%
801	Individual and Family Resource Management	5%	0%	0%	0%
	Total	100%	100%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	35.6	1.0	0.0	0.0
Actual Paid	36.7	0.7	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
750174	126385	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1121334	126385	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2184049	37092	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

To address the Community Viability planned program, we:

1. Conducted workshops in leadership development, facilitation, conflict management, community planning, community resource development, entrepreneurial and alternative economic development.
2. Delivered services in facilitation strategic planning, public listening sessions, land use discussions for community viability/community resource development issues
3. Developed print and electronic resources in community viability/community resource development
4. Provided and distributed available resources, including eXtension, in land use, community planning, leadership, facilitation, small business development and alternative economic development
5. Provided professional development training in facilitation, land use and leadership
6. Partnered with local, regional and state agencies, organizations, faith-based groups, etc.
7. Facilitated meetings of task forces, coalitions, committees, addressing community viability/community resource development issues
8. Conducted research on leadership development

2. Brief description of the target audience

Individuals, families, owners and managers of farms, and small businesses; local, state, and federal personnel and policy makers; community leaders and organizations; and private sector service suppliers are the targeted audiences.

3. How was eXtension used?

eXtension was used as a way to connect to Communities of Practice, online professional development training modules, connecting audiences to additional resources, and answering Ask an Expert questions.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	19171	38512	1972	61

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	14	22	36

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of education programs planned in public policy education

Year	Actual
2015	5

Output #2

Output Measure

- Number of communities and local governments partnering with Virginia Cooperative Extension faculty to seek and develop alternative economic development opportunities or address public policy and community planning goals.

Year	Actual
2015	45

Output #3

Output Measure

- The number of people completing in Master Financial Education Volunteer programs.
 Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Number of trainings, educational workshops, and on-line education sessions held in planned program are for targeted audiences.

Year	Actual
2015	307

Output #5

Output Measure

- Number of fact sheets, publications, newspaper articles, and curricula on community viability

Year	Actual
2015	95

Output #6

Output Measure

- Number of participants who report new leadership roles and opportunities undertaken
Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Number of plans adopted or implemented in business or community planning

Year	Actual
2015	15

Output #8

Output Measure

- Number of civic engagement events held

Year	Actual
2015	21

Output #9

Output Measure

- Number of businesses created, attracted, retained or expanded due to Extension program
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	Entrepreneurship - Increase the number of trained volunteers and citizens participating in Extension entrepreneurship workshops indicating increased entrepreneurial knowledge and skills applied to evaluation and planning of new enterprises (such as small businesses, micro-businesses, home-based businesses and agri-tourism).
2	Alternative Economic Development/Community Planning - Increase the number of communities and local governments partnering with Virginia Cooperative Extension faculty that seek and develop alternative economic development opportunities, and community planning goals.
3	Economic and Community Planning- Increase in self-reported preparedness among communities receiving economic development and community planning education
4	Facilitation Skills Training - Increase the percentage of trained volunteers and citizens participating in facilitation skills training that indicate improved knowledge and skills as a result of participation.
5	Leadership Development Education - Increase the percentage of adult citizens participating in leadership development education programs that indicate improved knowledge and skills as a result of participation.
6	Alternative Economic Development Opportunities through Urban Agriculture Efforts
7	Number of participants learning and implementing urban agriculture with community gardens and addressing food access concerns
8	Increased earnings of local entrepreneurs participating in non-tradition farmer's market model trainings

Outcome #1

1. Outcome Measures

Entrepreneurship - Increase the number of trained volunteers and citizens participating in Extension entrepreneurship workshops indicating increased entrepreneurial knowledge and skills applied to evaluation and planning of new enterprises (such as small businesses, micro-businesses, home-based businesses and agri-tourism).

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	52

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In order to encourage more organizations in Virginia to submit for USDA funding in the impact areas of local foods and farmers markets, USDA requested extension specialist institutional support from both VT and VSU to jointly conduct regional workshops to provide training and technical support to organizations interested in applying for either a USDA Local Foods Promotional Program (LFPP) & USDA Farmers Market Promotional Program (FMPP) grant in 2015.

What has been done

Through institutional cooperation, VSU and VT jointly organized and conducted 3 VCE regional USDA Local Foods Promotional Program (LFPP) & USDA Farmers Market Promotional Program (FMPP) grant writing workshops to interested community organizations and individuals.

Results

As a result of attending grant writing workshops, 52 individuals learned how to apply for USDA LFPP and FMPP grants. During the 2015 grant award cycle, Virginia applicants were awarded \$499,745 in USDA LFPP funding and \$277,884 in USDA FMPP funding, which was an increase in Virginia funding over the 2014 award cycle.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation

Outcome #2

1. Outcome Measures

Alternative Economic Development/Community Planning - Increase the number of communities and local governments partnering with Virginia Cooperative Extension faculty that seek and develop alternative economic development opportunities, and community planning goals.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	45

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rural counties are facing a series of economic challenges such as continued decline in the industries that once served as drivers of their economies, out-migration of talented workers, limited revenue streams for infrastructure maintenance and/or development, and access to high quality educational resources for developing and maintaining a skilled workforce. These constraints are sizable and often overwhelm the financial and management capacity of rural counties. However, when rural counties band together to recognized and build on their shared economic assets, and work together to remove the barriers to economic growth, utilize economic data, and build an evidence-based plan, then the possibilities of building a more vibrant region are defined.

What has been done

VCE and USDA Rural Development?Virginia partnered and applied to become a 2015 SET V state. Virginia was accepted as one of 13 states participating in the SET V initiative and solicited regional applications. Seven (7) Virginia regions representing 35 counties, 10 cities, and more than 8 towns submitted an application to receive technical assistance from the state?s SET team. Field visits were made to each region, Virginia?s coaching team completed training, 2 Virginia regions were selected for the 2015-16 SET initiative in August with the third region selected in November.

Results

Using the SET training materials, each of the three SET regions and the LEAD region will develop a multi-county regional economic development plan built on local regional strengths and assets. The planning process will develop regional ownership of the plan and will provide support through the implement phase resulting in a strong regional team with the capacity to lead the region to

achieve its goals. Regions recognized as developing a high-quality, evidenced-based plan will be eligible for a \$5,000 implementation grant. Virginia was a member of the SET V National Curriculum Team that received a 2015 NIFA Partnership Award.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #3

1. Outcome Measures

Economic and Community Planning- Increase in self-reported preparedness among communities receiving economic development and community planning education

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	650

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Planning commissioners are everyday citizens that are charged, as local appointed officials, with developing comprehensive land use plans, and making land use permit decisions. Their effectiveness and awareness of best planning practices has major impacts on the ability of Virginia's communities to meet the tripartite goals of economic development, environmental stewardship, and social capacity development. Programming in this area helps to ensure well planned communities that are business friendly, thereby sustaining agriculture into the 21st century.

What has been done

The Land Use Education Program banner (LUEP), a partnership between VCE and Virginia Tech's Center for Public Administration and Policy (CPAP), offers the Planning Commissioner's Certification Program and the Board of Zoning Appeals Certification Program. Other programs include an annual legal seminar and conference. Serving hundreds of community planners each year, these programs provide local appointed and elected officials, and the public, the prerequisite knowledge to make informed community planning decisions.

Results

In 2015, LUEP worked to provide education to over 650 Virginians. One hundred and twenty-six (126) planning commissioners, BZA members, and others graduated from our Certified Planning Commissioner and Board of Zoning Appeals programs. The reach of the program continues to increase annually nearly doubling our contacts from 2014 (347) and far outstripping LUEP's inaugural year (50). A total of 29 volunteers contributed nearly 80 hours of service as speakers and program liaisons. A six-month post-completion evaluation of LUEP graduates found examples of trainees feeling more confident in their duties because they became "conversant with planning issues and more enthusiastic about initiating action". Continued monitoring of program graduates is expected to show behavioral benefits to communities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #4

1. Outcome Measures

Facilitation Skills Training - Increase the percentage of trained volunteers and citizens participating in facilitation skills training that indicate improved knowledge and skills as a result of participation.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	25

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The 2009/2010 VCE strategic planning listening sessions and the 2014 Unit Situation Analysis and Issues Reports indicated community leaders needed assistance in creating change through individual and community leadership development, facilitation, and conflict resolution skills development. This need has been validated by the increased number of request received for assistance in decision-making and strategic planning.

What has been done

VCE equipped its agents and specialists with tools for planning and delivering facilitation services. Three, 15-hour facilitation workshops were delivered with over 25 individuals representing local citizens and agents. A 3-day training was also held for 37 individuals at Purdue University for

Purdue Extension faculty and members of the University of Illinois Extension. Moreover, 22 organizations/agencies requested facilitation services to launch 40 facilitated discussions and resulting in well-defined focus and plans of work for each group.

Results

Over 40 state organizations, agencies, and nonprofits requested facilitation services, resulting in collaborative decision-making, development of strategic plans, and direction for the organization. Follow up inquires to some groups indicated that Pittsylvania County unanimously approved hiring an economic development director because of the facilitated strategic planning discussions. Amherst County Board of Supervisors reported, "you have been fantastic from start to finish. From pre-event prep to post-op follow-up, your guidance has gotten us to exactly where we want to be with a fairly minimal effort on our part." Sister Maureen with Belmeade/Francis-Emma reported three grants totaling over \$210,000 were received because the organization had a well-defined strategic plan created through our collaboration.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #5

1. Outcome Measures

Leadership Development Education - Increase the percentage of adult citizens participating in leadership development education programs that indicate improved knowledge and skills as a result of participation.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

At the 2011 Virginia Rural Summit, the Shenandoah Valley Partnership CEO said "in some rural communities growth is slowed down by leadership." Rural regions are challenged to reinvent their economies from within by developing a new generation of civic leaders beginning at the grassroots level and including elected officials. Communities cannot wait for exceptional leaders

to appear but must ?help ordinary people become leaders? (Southern Rural Development Center).

What has been done

At least 21 community-based leadership programs/presentations were held in 2015. The Virginia Association of Counties Certified Supervisor program continues to be offered. Leadership in-service trainings were also held in Abingdon, Appomattox, and Richmond with over 40 agents completing the training. In addition, a moderated discussion on ?managing discussions on issues of conflict? was included as a VESA conference session.

Results

Enrollment in the VACo Certified Supervisor program has resulted in over 50 graduates since its inception. County supervisors completing the courses reported an increased understanding of their leadership role, knowledge of county government, and exposure to the work of VCE.

Elected officials indicated their continued support for Extension?s work within their counties.

Over 40 Extension agents were equipped with leadership skills and training materials that will be used within their community-based programs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #6

1. Outcome Measures

Alternative Economic Development Opportunities through Urban Agriculture Efforts

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to the Robert Wood Johnson Foundation, Petersburg is the unhealthiest location in Virginia; 36% of residents are obese, and 12% suffer from diabetes. Nearly 25% of Petersburg residents are considered food insecure. Adhering to dietary recommendations of eating five or more servings of produce may not be attainable for residents who are forced to shop at corner

markets and convenience stores. Many Petersburg residents lack cars, and walking or taking the bus to major grocery stores stocked with fresh produce may not be an option.

What has been done

An urban farm and food access initiative was launched and educational programs and urban agricultural research projects were implemented. A food hub to distribute local produce to inner city neighborhoods was formed, as well as the Harding Street Urban Agriculture Center to teach indoor production techniques and nutrition classes year-round. The Center also contributes to the economic development of Petersburg through training and promotion of agricultural enterprises, entrepreneurship and 21st century food production technology.

Results

Results of the VSU-COA urban farm and food access initiative include: 1) Working with Petersburg officials to recognize urban agriculture as a vital re-development solution and remove policies limiting agricultural practices in the city, thus encouraging residents to start small businesses growing and selling local farm products. 2) Worked with Petersburg to establish farmers markets within walking distance to food deserts. 3) Distributed 3,200 lbs. of local fresh produce to members in the community with a retail value of \$8,000 (\$2.50 per pound). 4) Educated 1000 visitors on science and business of indoor production. 5) Trained 175 volunteers to help build systems, plant and harvest indoors, build grow boxes, plant and harvest outdoors with a dollar value of \$13,842.00. 6) Generated \$85,000 in additional project funding.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development

Outcome #7

1. Outcome Measures

Number of participants learning and implementing urban agriculture with community gardens and addressing food access concerns

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	48

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nearly 18 percent of Virginia's residents live in a food deserts, defined as areas with low access to affordable and nutritious food. In such areas, fast-food restaurants and convenience stores that offer fewer healthy, affordable food options prevail over supermarkets and grocery stores. Vast food insecurity exists in the Southside region, but also in the Central, West Central, and Hampton Roads regions of Virginia.

What has been done

To respond to the challenge posed by the food deserts, Virginia State University Sustainable and Urban Agriculture Program (SUAP) conducted extensive educational activities including workshops and hands-on training. In addition, the program developed 6 educational resources in sustainable and urban agriculture.

Results

The program reached 48 participants who gained knowledge on various urban agriculture practices; 35 participants who received awareness on urban agriculture; and 18 participants who adopted some sustainable agriculture practices. The program provided technical assistance to start five community gardens and two inner city school gardens. The financial impact of training and offering technical assistance in urban agriculture include non-certified organic produce yields valued at over \$26,000. If the seven demonstration gardens were not started in 2015, low income, many below poverty, food desert residents would have likely had much less fresh produce to consume, making it difficult to consume the daily recommended amount for healthy lifestyles.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
801	Individual and Family Resource Management

Outcome #8

1. Outcome Measures

Increased earnings of local entrepreneurs participating in non-tradition farmer's market model trainings

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	68000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The socio-economic benefits of farmers' market establishment has attracted the attention of businesses. Few models exist for companies interested in starting an on-site farmers market. Cooperative Extension has an educational opportunity to educate and technically support companies interested in setting up a farmers market in non-traditional locations such as senior centers, nursing homes, or retail stores.

What has been done

In response to direct request from a local businesses and communities, Virginia State University Cooperative Extension Marketing and Agribusiness Program provided direct technical assistance in the form of market rules and regulations, farmer recruitment (vendor application), event organization and education, template promotional materials and marketing advisement to two Colonial Heights businesses (Boulevard Flower Gardens at Ruffin Mill, Dunlop House) to establish two area farmers markets.

Results

As a result of providing educational and technical support to foster the establishment of two Colonial Heights farmers markets, participating farmers and vendors earned a minimum of \$68,000 from January 2015 to September 2015. The Boulevard Flower Gardens Farmers Market will continue year-round in 2016. Plans to incorporate interested Dunlop House senior adult residents as a potential vendor in 2016 are being considered to enhance quality of life of senior center residents.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
608	Community Resource Planning and Development

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 (Lost of county educators)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

In many developing countries, such as Senegal, agriculture is a key driver of the economy, crucially important in terms of both economic growth and food security. Efforts to develop the agricultural sector in countries such as Senegal have shown promising results, yet widespread uptake of improved agricultural techniques and technologies has been stymied by a number of factors. Among these, one influential factor is the misalignment between current innovations in agricultural development, on one hand, and the system of agricultural education, training, research, and outreach on the other. Post-secondary agricultural education, professional training programs, research infrastructures, and capacities for community-based outreach are often out-of-date, under-resourced, and out-of-touch with the community development needs of people living in rural economies. The Education and Research in Agriculture (ERA) project in Senegal, funded by President Obama's Feed the Future initiative and administered by USAID/Senegal, seeks to improve nutrition and reduce food insecurity by strengthening human and institutional capacity in agricultural education, training, research, and outreach. In brief, ERA seeks to instill, in a culturally appropriate way, the land grant model into the Senegalese agricultural education system. ERA consists of three components: (1) Strengthening agricultural education and training, (2) Strengthening applied research and outreach, and (3) Project management and policy support. ERA implements numerous activities to operationalize these components, such as: scholarships for Senegalese students to pursue undergraduate degrees (in Senegal) and Master's degrees (in the U.S.); offering competitive sub-award grants for applied research on cereal crops, etc.; facilitating trainings on syllabus creation, curriculum development, e-learning, evaluation, etc.; and launching new programs, such as 4-H Senegal and a reflection group on higher education reform.

In 2015 and 2016 alone, ERA: funded 118 bachelors students and 20 Master's students; facilitated a nationwide e-learning symposium with the Ministry of Higher Education and Research (with over 130 participants); facilitated a nationwide symposium on innovative pedagogy (with 90 teacher and student participants from 8 institutions), and on syllabus development, assessment of student learning, seed curriculum development, service learning, and distance learning; facilitated a training and mentoring on syllabus development processes (at 10 institutions for over 122 faculty involved with over 160 syllabi created); funded research that produced over 10 new varieties of millet and rice, reached over 600 farmers through field days, produced over 7.5 tons of improved seed, and tested new management practices such as intercropping of mung bean with millet, canning sweet corn, etc. We also collaborated with newly created agencies to improve the evaluation and quality assurance of higher education and to help pass and operationalize a new law to impel higher education institutions to do more service learning and community development, and launched a 4-H youth development program, one of the first of its kind in francophone Africa.

Virginia agriculture is ranked as the number one state industry and is using every measure to maintain its economic impact on the state including the development of agricultural attractions that invite local residents and tourists onto agricultural land to experience a farm environment. Tourism generated \$21.2 billion in revenue in 2012, supported over 210,000 jobs, and provided \$2.7 billion in state/local taxes. Agritourism ventures are an integral part of the tourism sector and viewed as having a beneficial impact on their economies. In the 2012, Chumura Economics & Analytics study revealed that income from agritourism and farm-related recreation in Virginia increased from \$2.7 million in 2002 to

\$12.9 million in 2007. Agritourism activities in the Shenandoah Valley alone generated an estimated \$22.4 million in 2011 resulting in an annual impact of \$34.8 million and supporting 811 community-based jobs. Another example of successful agritourism development is the growing number of Virginia wineries from 129 in 2005 to 253 registered in 2015.

In 2013-2014 a Virginia research study was completed on the financial impact of agritourism for Virginia farmers, the conditions that encourage a successful operation, the development of strategic alliances in this sector, and agritourism' regional economic impact.

As a result of Extension programming, publications, and individual conversations with agritourism entrepreneurs, agritourism is now recognized as an economic development tool.

Extension's 2013-2014 agritourism economic impact study provided a foundation for understanding the financial possibilities for agritourism and offered the agritourism entrepreneurs baseline data for assessing their operation. Over 70 percent of Virginia agritourism operations report increasing farm revenues because of the agritourism events. Agritourism operations are continuing to expand their plans, communities are preparing zoning ordinances that support the farm operations, and Virginia agencies are continue to collaborate on building a stronger support system for agritourism.

Key Items of Evaluation

Over 70 percent of Virginia agritourism operations report increasing farm revenues because of the agritourism events.

Case study - building capacity in Senegal to replicate a land-grant system

The Education and Research in Agriculture facilitated a nationwide e-learning symposium with the Ministry of Higher Education and Research (with over 130 participants); facilitated a nationwide symposium on innovative pedagogy (with 90 teacher and student participants from 8 institutions), and on syllabus development, assessment of student learning, seed curriculum development, service learning, and distance learning; facilitated a training and mentoring on syllabus development processes (at 10 institutions for over 122 faculty involved with over 160 syllabi created); funded research that produced over 10 new varieties of millet and rice, reached over 600 farmers through field days, produced over 7.5 tons of improved seed, and tested new management practices such as intercropping of mung bean with millet, canning sweet corn, etc. We also collaborated with newly created agencies to improve the evaluation and quality assurance of higher education and to help pass and operationalize a new law to impel higher education institutions to do more service learning and community development, and launched a 4-H youth development program, one of the first of its kind in francophone Africa.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Food, Nutrition, and Health

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
112	Watershed Protection and Management	2%	0%	0%	0%
305	Animal Physiological Processes	0%	0%	10%	0%
501	New and Improved Food Processing Technologies	3%	0%	10%	0%
502	New and Improved Food Products	5%	0%	7%	0%
604	Marketing and Distribution Practices	5%	0%	5%	0%
702	Requirements and Function of Nutrients and Other Food Components	5%	0%	10%	100%
703	Nutrition Education and Behavior	36%	70%	3%	0%
704	Nutrition and Hunger in the Population	2%	20%	0%	0%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%	0%	15%	0%
721	Insects and Other Pests Affecting Humans	2%	0%	20%	0%
723	Hazards to Human Health and Safety	10%	0%	15%	0%
724	Healthy Lifestyle	30%	10%	5%	0%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	43.2	4.0	24.1	4.0
Actual Paid	17.8	2.0	37.7	3.0
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
555684	343693	495262	159593
1862 Matching	1890 Matching	1862 Matching	1890 Matching
830618	343693	1088524	357861
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1617814	45000	6825230	111648

V(D). Planned Program (Activity)

1. Brief description of the Activity

Food, nutrition, and health - Conduct educational classes, workshops, meetings, and trainings; develop products, curriculum, resources, facilitate coalitions and/or task forces; conduct assessments and community surveys; partner with community agencies and institutions to facilitate programs and community development; create/revise social systems and public policies; conduct research studies, disseminate program and research results through papers, reports, and media; develop and implement marketing strategies using various outlets to promote program participation; disseminate research-based information to consumers using a variety of media and technology resources; cooperate with media and other community agencies to seek effective means of reaching new and non-traditional audiences, and respond to consumer inquiries.

Vector-borne diseases and public health pests - Conduct research to further our understanding of vector-borne diseases caused by insects and pests, and disseminate science-based results to stakeholders through workshops, trainings, etc.

Food Safety: Conduct educational classes, workshops, meetings, and trainings, develop products, curriculum, resources, facilitate coalitions and/or task forces, conduct assessments and community surveys, partner with community agencies and institutions to facilitate programs and community development, create/revise social systems and public policies, conduct research studies, disseminate program and research results through papers, reports, and media, develop and implement marketing strategies using various outlets to promote program participation, disseminate research-based information to consumers using a variety of media and technology resources, cooperate with media and other community agencies to seek effective means of reaching new and non-traditional audiences, and respond to consumer inquiries.

Childhood obesity: Conduct educational classes, workshops, short courses, meetings, seminars, and trainings for children, parents, teachers, school food service workers, and health and other professional groups; develop curriculum, newsletters, and other educational resources; establish and implement train-the-trainer models to promote educational opportunities; facilitate local and statewide coalitions and/or task forces; conduct assessments and community surveys; partner with community agencies and institutions to facilitate programs and community development; contribute to the creation/revision of social systems and public policies; conduct research studies and disseminate program and research results to both the professional community and lay public through journal articles, papers, reports, and public media; develop and implement marketing strategies using various outlets to promote program participation and reinforce other activities, with special attention to underserved and

disadvantaged audiences; disseminate research based information to lay audiences and address emerging needs using a variety of media and innovative technology resources; cooperate with media and other community agencies to seek effective means of targeting new and non-traditional audiences; and respond to consumer inquiries. Programs will be behaviorally-focused and help facilitate children and youth meeting the current U.S. Dietary Guidelines for Americans. Recommendations include: A) consuming more healthy foods such as: vegetables, fruits, whole grains, fat-free or low-fat milk and milk products, seafood, lean meats and poultry, eggs, beans and peas, and nuts and seeds; B) consuming less foods/food components that are commonly eaten in excess such as: sodium, solid fats, added sugars, and refined grains; and C) following healthy eating patterns such as: eating breakfast, eating as a family, making healthy snack choices, etc. Activities include leadership, civic engagement, 4-H camping programs (overnight and day), 4-H after-school programs, 4-H in-school programs, 4-H school enrichment programs, 4-H clubs (community and military), 4-H special interest programs, 4-H Cloverbud groups, district 4-H trainings, local 4-H trainings, home school education, online education and distance learning, and specialized trainings and workshops to qualify instructors and to educate trainers.

Family Nutrition Program: Nutrition education will be taught to Virginia's Supplemental Nutrition Assistance Program (SNAP) participants and those eligible for SNAP. Participants completing the comprehensive programs will be assessed to determine that behavior change has been attained as well as increasing their food security levels. Nutrition education will be provided to EFNEP youth and adults and those who are up to 185% of the Federal Poverty guidelines. Participants completing the comprehensive programs will be assessed to determine that behavior change has been attained as well as increasing their food security levels. Youth participants will receive either SNAP-Ed or EFNEP lessons according to policy and procedures across Virginia.

Local Food Systems: Conduct consumer education workshops and training on food budgeting, the cost effectiveness of local and regional foods, healthy eating and cooking skills.

- Conduct educational programs on crop and livestock production specific to local marketing channels
- Conduct research on the social, economic and environmental impacts of local or regional food system to communities.
- Conduct research on local or regional food system impact on the dietary and health of consumers
- Encourage collaboration and partnerships to improve food availability, food access, and consumption of fresh, nutritious local foods
- Provide educational programming on whole farm planning, resource management planning, marketing, food safety, and other educational needs to improve supply and availability of local foods.
- Develop and conduct a Virginia food system assessment
- Continue to implement the Virginia Farm-to-Table Plan
- Organize and conduct, local regional and state conferences

Specialty Foods: Assist small business and producers to develop and market value-added agricultural food products.

2. Brief description of the target audience

Food, nutrition, and health - Young adults (ages 18 to 59), older adults (age 60 and older), caregivers of older adults, adults with type 2 diabetes, parents and caregivers of individuals with type 2 diabetes, senior center and meal site staff and volunteers, and Extension educators; small and large commercial food processors, food service and retail food industries and suppliers; farmers' markets; health care providers and suppliers; biopharma companies and suppliers.

Vector-borne diseases and public health pests - Researchers, public health agencies, schools, institutions, Extension educators; health care specialists;

Food safety education's target audience includes retail and food service employees, retail and food service management, temporary food vendors, child care providers, young adults (ages 25-59), older adults (ages 60 and older), Extension educators, other researchers, policy makers, commercial food processors, and fresh produce producers.

Childhood Obesity: young children (ages 2 - 5 years); school-age children; adolescents; parents, foster parents, grandparents; caregivers (in-home and for-profit day care providers); teachers, 4-H volunteers and other school faculty for young children, youth, and adolescents; school nutrition directors and staff; school wellness committees; school nurses and other health care providers; and Extension educators.

Family Nutrition Program: The target population is comprised of people who are SNAP and WIC participants as well as those who are eligible to participate in those programs. The youth participants attend schools that have a high percentage of students (>50% Free and Reduced lunch schools) participating in the Free and Reduced Lunch program. People who have income levels more than 185% of the federal poverty guidelines are not enrolled as program participants. Frequently, participants have dropped out of school, have minimal job skills, have multiple health conditions, stemming from issues related to obesity and have many economic constraints due to poverty.

Local Food Systems: The program's target audience is Virginians most susceptible to food insecurity and hunger with specific on producers, consumers and local food system stakeholders that can improve food availability and affordable access.

Specialty Foods: Home-based business potential and existing owners, and agricultural producers.

3. How was eXtension used?

eXtension was used to connect Extension professionals with communities of practice, professional development trainings, and additional resources for use in programming. eXtension has also been used as an additional source of science-based information, resources, and experts for program participants.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	116368	179818	1153203	3958

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

Patent Applications Submitted

Year: 2015

Actual: 1

Patents listed

Novel Methylerythritol Phosphate Pathway Inhibitors

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	73	236	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of adults participating in diabetes educational programs.

Year	Actual
2015	169

Output #2

Output Measure

- Number of adults participating in at least one session on adult nutrition, fitness, worksite wellness, or health.

Year	Actual
2015	729

Output #3

Output Measure

- Number of research papers published on food, nutrition and health.

Year	Actual
2015	208

Output #4

Output Measure

- Number of Master Food volunteers trained to extend the work of an Extension educator.

Year	Actual
2015	187

Output #5

Output Measure

- Number of food nutrition and health publications.

Year	Actual
2015	1080

Output #6

Output Measure

- Number of workshops, conferences, posters, and presentations on food nutrition and health.

Year	Actual
2015	1282

Output #7

Output Measure

- Number of fresh produce producers attending on farm food safety trainings provided through Virginia Cooperative Extension.

Year	Actual
2015	263

Output #8

Output Measure

- Number of youth participating in Extension nutrition education, physical activity, or other obesity-prevention programs at childcare centers, schools, after school programs, camps, or other settings.

Year	Actual
2015	73341

Output #9

Output Measure

- Number of adults, participating in Extension nutrition education, physical activity, or other obesity-prevention programs.

Year	Actual
2015	729

Output #10

Output Measure

- Number of active research projects on food, nutrition and health.

Year	Actual
2015	86

Output #11

Output Measure

- The number of food handlers completing food safety training.

Year	Actual
2015	1904

Output #12

Output Measure

- The number of workshops conducted on food safety practices for industry, producers and consumer organizations.

Year	Actual
2015	22

Output #13

Output Measure

- Number of home based business entrepreneurs and producers seeking assistance from the Food Processor Technical Assistance Program.

Year	Actual
2015	304

Output #14

Output Measure

- Number of youth engaged in Healthy Lifestyles.

Year	Actual
2015	65951

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase in the number of individuals with diabetes who have improved their Hemoglobin A1c level, meal planning behaviors or physical activity behaviors, three months after participating in a Diabetes Education programs offered in collaboration with a local health care provider.
2	Increase in number of adults that make lifestyle changes which improve their dietary quality and/or physical activity level after participation in VCE programs.
3	Number of discoveries from completed obesity related research projects which focus on examining adult obesity from its root causes to its association with chronic disease.
4	Number of discoveries from completed research projects which focus on vector-borne diseases and public health pests.
5	Increase in the number of Virginia fresh produce growers that change their behaviors to reflect safer practices on their farms, reducing the risk of contamination of produce with foodborne pathogens ultimately preventing foodborne illness.
6	Increase in the number of local food and farm enterprises that improve and strengthen their profitability and viability through partnering with Virginia Cooperative Extension.
7	Increase in the number of local food and farm enterprises that improve their market development, business planning, and conservation of natural resources by partnering with Virginia Cooperative Extension.
8	Evaluation of two patient-centered, theory-based, technology-enhanced diabetes prevention programs to initiate and sustain weight loss among pre-diabetic adults within a health care setting.
9	Researchers evaluating how to increase food availability and access to communities in the Appalachia regions of VA, NC and WV
10	Increase the number of youth participating in foods, nutrition, and health programs that demonstrate healthy living choices.
11	Increase in number of families/caregivers that make lifestyle changes which improve their dietary quality and/or physical activity level after participation in VCE programs.
12	Increase the number of local communities partnering with Virginia Cooperative Extension faculty to strengthen and develop the connection between local agriculture producers and growers with local food-related businesses and purchasing institutions resulting in reduced food insecurity and hunger.
13	Increase the number and knowledge of local food and farm enterprises partnering with Virginia Cooperative Extension to improve and strengthen their profitability and viability through market development, business planning, and conservation of natural resources.
14	Pomace from Virginia-grown Grape Varieties as a Potential Source of Antioxidant and Antibacterial Compounds for Value-Added Application
15	Increase knowledge of and intent to increase consumption of fresh produce to combat obesity and chronic disease
16	Breakfast at school: The role of time and place for participation and nutritional intake

17	Relationship Between Food Price, Time and Energy
18	School community participation influences sugar sweetened beverage intake among Appalachian adolescents

Outcome #1

1. Outcome Measures

Increase in the number of individuals with diabetes who have improved their Hemoglobin A1c level, meal planning behaviors or physical activity behaviors, three months after participating in a Diabetes Education programs offered in collaboration with a local health care provider.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	85

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Diabetes is the 7th leading cause of death in Virginia. Over 530,000 Virginians have been diagnosed with diabetes, and an estimated 2 million Virginians have prediabetes, meaning they are at higher risk of developing type 2 diabetes, heart disease, and stroke. In Virginia diabetes leads to 11,700 hospitalizations each year adding nearly \$173 million to our health care bill. The burden of diabetes is disproportionate to African Americans, Hispanics, the elderly, those with limited income, and the medically underserved.

What has been done

VCE partnered to offer 16 Balanced Living with Diabetes (BLD) programs in 12 African American churches and two senior centers. Moreover, an adapted version for Hispanic audiences (HBLD) was offered in 2 counties. BLD and HBLD help people with type 2 diabetes and their families learn about self-care, food choices to control carbohydrate intake, and life style patterns that prevent or slow the complications of their disease. BLD/HBLD offer 4 weekly classes, a reunion class 3 months post, and reassessment 6 and 12 months.

Results

In 2015 169 Virginians participated in BLD; 95% were African American and 80% female. About one-third had annual incomes below \$20,000. Overall, participants increased meal planning to control carbohydrate intake, eating meals at regular times, and consuming fruits, vegetables and

other high fiber foods. Results from the 69 HBLD participants were similar. For BLD about half of those returning for the 3-month reunion lowered their hemoglobin A1C. Average changes fell in the range of 0.5%. Less change was observed within the HBLD program. Persons benefitting most from BLD/HBLD are those with baseline A1c above 7.0% (an A1c below 7.0% is recommended for persons with type 2 diabetes). A decrease in A1c of even 1.0% lowers the risk of blindness or renal failure by 40%.

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #2

1. Outcome Measures

Increase in number of adults that make lifestyle changes which improve their dietary quality and/or physical activity level after participation in VCE programs.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Americans? over-consumption of sugar-sweetened beverages (SSB) and the associated adverse health consequences of excessive caloric and/or added sugar consumption (i.e. obesity, type II diabetes, coronary heart disease, dental caries, and cancer) are well-established. The prospect of understanding and intervening on nutrition numeracy, nutrition-related media literacy, and motivation/intention processes to improve SSB behaviors under real world and naturally occurring community environments has widespread public health implications.

What has been done

Researchers conducted a two group randomized controlled trial to determine the relative effectiveness of a Theory of Planned Behavior-based sugar-sweetened beverage intervention

with an enhanced and integrated nutrition literacy component targeting nutrition numeracy and nutrition-related media literacy, as compared to a matched-contact control condition. Targeting a medically-underserved rural region in southwest Virginia, 1,056 adult participants were screened, 620 (59%) eligible, 301 (49%) enrolled and randomized, and 296 included in the 2015 analyses.

Results

Participants were 93% Caucasian, 81% female, 31% high-school educated, 43% <\$14,999 household income, and 33% low health literate. Retention rates (74%) and program engagement was not statistically different between conditions. Compared to MoveMore, SIPsmartER participants significantly improved SSB kcals and BMI at six months. SIPsmartER participants significantly decreased SSB intake by 227 (95% CI=-326, -127, p<0.001) kcals/day from baseline to 6-months when compared to the decrease of 53 (95% CI=-88, -17, p<0.01) kcals/day among MoveMore participants (p<0.001). SIPsmartER participants decreased BMI by 0.21 (95% CI=-0.35, -0.06; p<0.01) kg/m2 from baseline to 6-months when compared to the non-significant 0.10 (95% CI=-0.23, 0.43; NS) kg/m2 gain among MoveMore participants (p<0.05). Significant 0-6 month effects were observed for about half of the theory-based constructs, but for no biological outcomes. Health literacy status did not influence retention rates, engagement or outcomes. SIPsmartER is an effective intervention to improve SSB consumption among adults and is promising for translation into practice settings. SIPsmartER also yielded small, yet significant, improvements in BMI. By using health literacy-focused strategies, the intervention was robust in achieving reductions for participants of varying health literacy status. Our trial has advanced the scientific literature related to health behaviors, diet quality, biomarkers, reach, and implementation outcomes.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Number of discoveries from completed obesity related research projects which focus on examining adult obesity from its root causes to its association with chronic disease.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Obesity is a rising epidemic worldwide, particularly in the developed countries including the United States. Obesity and obesity-induced type 2 diabetes represent a substantial economic burden - now they account for over twenty percent of U.S. health care costs. The southeastern region of Appalachia, including counties in Southwest Virginia, have some of the highest rates of obesity and related diabetes in the nation. As a new faculty member from the obesity cluster recently recruit at Virginia Tech, this project is part of interdisciplinary obesity research programs that promote and protect the public's health through scientific discovery.

What has been done

The benefits of physical exercise to combat common chronic diseases such as obesity, type 2 diabetes, cardiovascular diseases have been extensively documented. However, the molecular mechanisms by which exercise exerts its positive effects are mostly unknown. A recent study has uncovered a molecular mechanism by which exercise-induced browning can occur, involving a newly identified PGC-1alpha-induced myokine. Bostrom et al. showed that increased levels of PGC-1alpha in muscle cells induced the expression of the type I membrane protein FNDC5, which is cleaved and secreted into circulation. The secreted portion of FNDC5, a newly identified myokine known as irisin, binds to undetermined receptors on the cell surface of white adipose tissue (WAT). By an incompletely understood mechanism, irisin induced the expression of UCP1 and other brown adipose tissue (BAT)-associated genes in WAT. Thus irisin functions as a muscle-derived energy-expenditure signal that directly communicates with adipose tissue and induces browning. This effect improved the tissue metabolic profile and increased whole-body energy expenditure, making irisin a potential new target for the treatment of metabolic diseases. The discovery of irisin opens door for comprehensive structure and function studies on this hormone.

Results

We discovered wild type irisin exists as dimer in solution and it may be prone to aggregation in vitro. We have mapped out iris in's dimer interface. More excitingly, we discovered monomeric irisin variants can be functionally active. Important questions need to be answered: which regions or specific amino acid residues are the functional site(s); what is the molecular structure of this potentially important hormone? Why irisin is prone to aggregation and to engineer stable active form(s) of irisin (monomeric or dimeric) for both biochemical and biophysical characterizations and potential therapeutic application. Another important next step will be to identify the specific cell surface receptor for irisin and specific molecular pathways that underlie browning. We also discovered potential new anti-diabetes function for irisin in collaboration with Dr. Dongmin Liu's group (HNFE). Two relevant papers have been published and several seminar/talk/posters have been presented at local or national conferences.

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #4

1. Outcome Measures

Number of discoveries from completed research projects which focus on vector-borne diseases and public health pests.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

?Mosquitoes and the diseases they transmit, such as malaria, are a significant global public health concern. Mosquito surveillance is used to assess the prevalence of disease vectors and to evaluate the effectiveness of control measures. When monitoring adult mosquito activity, several issues should be considered including the species of interest and the goal of collection, i.e., population estimates, vector identification, virus isolation, disease activity. Many different traps have been developed and each has distinct pros and cons (see Silver 2008 for a review). Light-traps supplemented with carbon dioxide, and gravid traps, have been widely used in the USA, especially for arbovirus surveillance. Baited light traps collect a greater number and species of mosquitoes, but most of the individuals are unfed, lowering the chances of collecting an infected mosquito. Gravid traps tend to collect fewer individuals and species, but these mosquitoes are gravid and thus have taken at least 1 blood meal. This increases the probability of collecting infected individuals. Also, gravid traps more effectively collect many species of Culex mosquitoes and the invasive Aedes japonicus.

What has been done

?New trap designs were tested in a series of greenhouse experiments to address the limitations of the existing traps. Design requirements included the following: 1) the ability to collect all physiological states (unfed/fed/gravid) of female mosquitoes to accurately reflect the population structure in a given area; 2) must not damage specimens so that identifications and molecular diagnostic procedures can be performed; 3) should be easily transported; and 4) must be inexpensive to construct. Meeting these design criteria would produce a trap that could be used not just in the USA but also in the developing world where vector-borne diseases are devastating.

Results

?We have designed a novel dual-use trapping device for mosquito surveillance that is robust, portable, easy to construct, and effective for multiple species and different physiological stages. The modular design allows flexibility to configure the device as a light and/or gravid trap in a variety of combinations of attractants and collection methods that are best suited to the needs of the particular study. An additional feature is that the trap can be produced on a 3D printer. We are preparing a patent application.

4. Associated Knowledge Areas

KA Code	Knowledge Area
721	Insects and Other Pests Affecting Humans
724	Healthy Lifestyle

Outcome #5

1. Outcome Measures

Increase in the number of Virginia fresh produce growers that change their behaviors to reflect safer practices on their farms, reducing the risk of contamination of produce with foodborne pathogens ultimately preventing foodborne illness.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	263

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Approximately 48 million foodborne illnesses occur annually and the CDC reports that fresh produce accounts for more illnesses than any other commodity. The Food Safety Modernization Act (FSMA) and the changing regulatory environment has tightened food safety requirements. Thus, it is critical for Virginia produce farms to have access to food safety education, which provides individually tailored training in risk-based food safety principles and best practices for risk mitigation.

What has been done

To promote food safety culture at local, regional, state, and national levels, the VCE Fresh Produce Food Safety Team (FPFST) provided comprehensive on-farm and marketplace food

safety education. Materials were developed and training offered on mentoring agents/growers in GAP certification, conducting a consumer preference survey to assess perceptions of food safety practices, conducting a market assessment for food procurement requirements and food safety expectations in six market sectors, and antibiotic resistance in produce.

Results

Approximately 263 growers gained awareness and knowledge of on-farm risk reduction practices; 26 growers were mentored in GAP certification preparation with 6 farms successfully passing USDA GAP audits; and 75 growers were assisted with FSMA compliance questions. Awareness and knowledge increases from on-line resources included 1452 views for ?Reducing Antibiotic Resistance from Farm to Fork? website, 3732 reach for ?Virginia Fresh Produce Food Safety? Facebook page, and 177 views for ?Fresh Produce Food Safety Risk Assessment? and ?Greenhouse GAPs? YouTube videos. While data obtained from the consumer phone survey is still being analyzed, there were 679 completes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #6

1. Outcome Measures

Increase in the number of local food and farm enterprises that improve and strengthen their profitability and viability through partnering with Virginia Cooperative Extension.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	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
724	Healthy Lifestyle

Outcome #7

1. Outcome Measures

Increase in the number of local food and farm enterprises that improve their market development, business planning, and conservation of natural resources by partnering with Virginia Cooperative Extension.

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

Evaluation of two patient-centered, theory-based, technology-enhanced diabetes prevention programs to initiate and sustain weight loss among pre-diabetic adults within a health care setting.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

?The American Diabetes Association estimates that there are 25.8 million (8.3%) adults in the United States with diabetes, in addition to the 79 million adults with pre-diabetes, and strongly recommends healthcare approaches to prevent diabetes. Individuals with pre-diabetes are likely to develop type 2 diabetes within 10 years, further highlighting the importance of early interventions. Due to the continued growth of the obesity epidemic, the burden of pre-diabetes and diabetes is expected to continue to rise. As there is no known treatment available to cure diabetes and self-management for those with diabetes remains a challenge, the importance of

prevention is paramount. Further, interventions to prevent diabetes are intensive and have difficulty with implementation in healthcare settings and in recruiting patients to participate.

What has been done

?In collaboration with Carilion Clinic and funding from NIH, VT researchers are exploring the impact of two different lifestyle interventions, targeting physical activity and improved eating habits, to produce modest weight loss which may delay or prevent the onset of type 2 diabetes. The primary objective of our study is to determine the reach and effectiveness of two diabetes prevention interventions. This is a pragmatic clinical trial that employs a hybrid preference/randomized controlled design to evaluate if the two diabetes prevention programs will produce objectively verified weight loss when compared to a standard care control.

Results

To date, we have identified patients from 3 (out of 12 total) family practice clinics, and will be continuing this process over the next 12 months or so. So far we have identified 4,500 potential participants from these 3 clinics. To date, 240 participants have been enrolled in the choice condition; 79% of the participants enrolled in the choice condition are female with 64.6% being white, 33.3% black, 43% married, 38% making less than \$15,000 per year, 34% having completed some college or technical school, 38% employed full-time, and 38% receiving private insurance from the employer.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Researchers evaluating how to increase food availability and access to communities in the Appalachia regions of VA, NC and WV

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

?A network of multidisciplinary/multi-unit research, teaching and outreach collaborative teams between on-campus and off-campus faculty, including VCE faculty, staff and county extension offices, and multiple tri-state community stakeholders can approach regional food security challenges more broadly. The impact is integrated across research, teaching-education, extension and outreach. The NIFA-funded Appalachian Foodshed Project?s work in partnership with southwest Virginia communities supports, connects, and enhances local food development and advocates strategies to promote community food security in the region.

What has been done

?The interdisciplinary team of faculty, graduate students and community partners engages in collaborative scholarship efforts as part of the NIFA-AFRI-USDA Appalachian Foodshed Project (AFP). This NIFA grant (Enhancing Food Security by Cultivating Resilient Food Systems and Communities) is evaluating how to increase food availability and access to communities in the Appalachia regions of VA, NC and WV. The team includes VT faculty, extension offices, two land grant universities plus community-based organizations. All collaborate to investigate a systems-thinking approach to enhance community food security through local and regional food systems within the tri-state Appalachia region. The AFP uses community-based participatory research methodology to address issues of food security. The goal is to empower community organizations to network with those working on similar issues related to community development, economic viability, health and nutrition, food access, social justice, and agriculture. The AFP builds upon human and natural resources to improve access, expand food security, and enhance food economies, especially in communities that have been underserved and economically vulnerable. By working with cooperative extension, communities, farmers, policymakers, NGOs, and institutions, we all better understand the food system and can implement changes that will have long-term benefits for all in the region. AFP embodies the land grant university mission to improve community food security by enhancing connections in the local-regional food economies in the Appalachian region of VA, WV & NC.

Results

?Community Food Security Assessments engaged 100+ stakeholders. County profiles were generated. Food systems model entered the validation stage. A graduate course (Food Security & Resilient Communities) was developed and taught, grounded in experiential learning & innovative pedagogical methodologies. eXtension Community of Practice, Community, Local & Regional Food Systems (CLRFS) was developed with other NIFA projects, academics and community practitioners. Practitioner interviews (n=48) were completed, transcribed, and edited from across the region and analysis is underway. A website showcases these narratives (Stories of Community Food Work in Appalachia). Community Enhancement Grants (n=15) were awarded across VA, WV & NC. Outreach and publications include: AFP website; Facebook & blog posts created online social networks for people working in the region. Facebook has 478 likes, blog 4884 views. Monthly topical webinars and AFP listserv (~300 participants) serve community and academic partners. AFP supported development of LocalWiki, an online information-sharing platform on food systems work in the region. This effort leveraged partnerships with the Virginia Governor?s Council on Bridging the Nutritional Divide, Virginia Cooperative Extension, and NGO partners.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
704	Nutrition and Hunger in the Population

Outcome #10

1. Outcome Measures

Increase the number of youth participating in foods, nutrition, and health programs that demonstrate healthy living choices.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	71375

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Childhood obesity is a major public health concern because of numerous potential long-term health and emotional consequences, including many that extend into adulthood. It is estimated that obesity affects 17% of children, about 12.7 million children and adolescents, with higher rates among low-income populations. Although these levels seem to be stabilizing, children represent a vulnerable and important population for identifying, promoting, and sustaining healthy behaviors.

What has been done

Good nutrition and physical activity are central to addressing child obesity. The Virginia Family Nutrition Program offers nutrition education programs to youth ages three to 19 using developmentally-appropriate curricula. Classes are taught using an experiential design and address key dietary and physical activity topics for childhood obesity prevention, such as: increasing fruit, vegetable, whole grain, lean meats, low-fat dairy, and bean consumption; increasing physical activity and reducing sedentary activity.

Results

A total of 71,375 youth enrolled in the six or more hour nutrition programs. Based on pre-/post-tests, middle aged children (grades 3-5) reported marked improvements across a variety of programs. For example, following the program, 92.4% reported being physically active and 91.9% reported eating fruit ?most of the time? or ?always.? Older youth (grades 6-8) indicated that they

were more physically active and had less screen time after participation in SNAP-Ed. Additionally, 27.3% reported improvements in fruit consumption (three to four servings per da6), 22.5% vegetable consumption (3-4 servings), and 21.8% whole grain (?most of the time? or ?always?). SNAP-Ed programs reach high-risk youth in meaningful ways to reduce risk of childhood obesity.

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #11

1. Outcome Measures

Increase in number of families/caregivers that make lifestyle changes which improve their dietary quality and/or physical activity level after participation in VCE programs.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	176

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Regular physical activity and healthy eating habits are important factors contributing to quality of life and prevention of chronic disease. However, most Americans are insufficiently active and do not consume fruits and vegetables in amounts necessary for good health. In Virginia, over 50% of adults do not meet the current public health recommendations for physical activity, while over 70% of adults are not meeting the current dietary guidelines for fruits and vegetables.

What has been done

To increase physical activity and consumption of fruits and vegetables, FitEx was conducted in 21 localities with 764 adults. Over 8 weeks, 138 six-member teams pooled miles earned to ?walk? across Virginia. Miles of physical activity and cups of fruits and vegetables were posted weekly on the FitEx website and weekly newsletters with behavior change strategies were shared. Statewide, 729 people participated in the program. Participants averaged 46 years of age, and 84% were female and 25% represented races other than Caucasian.

Results

Participants who were not meeting the physical activity guidelines prior to the start of the program showed significant increases in physical activity by approximately 173 minutes per week. Within the state of Virginia, participants "walked" 39,681 miles. In addition, the proportion of participants meeting the program goal of 5 cups of fruits and vegetables maintained or improved from 18.8% at the start of the program to 23.3% at the end of the program. This reflects, on average, an increase in 1.40 cups of fruits and vegetables per day!

4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

Increase the number of local communities partnering with Virginia Cooperative Extension faculty to strengthen and develop the connection between local agriculture producers and growers with local food-related businesses and purchasing institutions resulting in reduced food insecurity and hunger.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Suffolk, 63% of adults and 25% of children are overweight. Healthy choices such as eating five or more servings of produce may improve overall weight. Yet, in low income inner city neighborhoods, access to fresh produce is limited by lack of nearby grocery stores with produce departments. Lack of transportation and adequate funds to purchase local fresh produce from distant grocery stores reduces the likelihood that low income individuals and families will have adequate nutritious produce to eat on a daily basis.

What has been done

To address City of Suffolk food desert issues, the marketing and agribusiness specialist and local

ANR agent partnered to design and implement a comprehensive educational program to teach individuals how to buy, cook, and eat local foods from area farms. An OBICI foundation grant for \$25,000 was provided to implement the project.

Results

As a result, 178 individuals (either grandparents or parents) within the City of Suffolk with income below the poverty level learned how financial literacy, cooking and nutrition skills. Five local farmers earned a total of \$7,535 and reported making over 10% of their current farm sales income from participation in pilot food desert distribution program. Prior to event 91% of attendees self-assessed themselves as overweight and unhealthy; over 50% ate out 2-7+ times every week, and 90% did not eat or feed their family 5 produce items a day. After the events, 100% wanted to include more produce in their diet, and that learning how to cook local foods helped them and would buy from Veggie Van if it came to their neighborhood in future. Due to early promising results, the OBICI foundation has invited a \$250,000 grant application.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
604	Marketing and Distribution Practices
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population

Outcome #13

1. Outcome Measures

Increase the number and knowledge of local food and farm enterprises partnering with Virginia Cooperative Extension to improve and strengthen their profitability and viability through market development, business planning, and conservation of natural resources.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

?Produce Food Safety is of considerable interest due to contemporary outbreaks of foodborne illnesses associated with produce. Each year, about 48 million Americans (1 in 6) get sick, 128,000 are hospitalized, and 3,000 die from foodborne diseases, according to estimates from the Centers for Disease Control and Prevention. Fruits and vegetables, in particular leafy greens and fruits consumed raw, often serve as vehicles for transmission of human enteric pathogens. There have been at least three outbreaks of salmonellosis resulting from contaminated tomato fruit that were determined to have originated from the Eastern Shore of Virginia (ESV). In addition, an outbreak strain was recently isolated from raw poultry litter obtained for a soil fertility study that was being conducted at the Virginia Tech Eastern Shore Agricultural Research and Extension Center (ESAREC). Current publications by FDA indicated that ?Tomatoes grown along the eastern shore of Virginia are implicated almost yearly in Salmonella illnesses.? To better understand the prevalence of foodborne pathogens in irrigation water, chicken manure and amended soil and to assess the food safety risks, science-based data about the Prevalence, Distribution and Diversity of enteric pathogens in major agricultural regions associated produce-borne illnesses are needed.

What has been done

?Objective 1: Four pair of representative irrigation ponds and wells from four farms on ESV were selected for the detection of Salmonella spp. and measurement of environmental factors, including two farms in Accomack County at Homtown, VA and Painter, VA as well as two farms in Northampton County at Seaview, VA and Cheriton, VA. Presence/absence of Salmonella and quantify Salmonella in positive samples were tested by the improved MPN method using 4 tubes x 3 dilutions (Rajabi, 2011). Salmonella enterica colonies were confirmed by invA gene-based PCR. Irrigation water was analyzed for conductivity (mS/cm), temperature (oC), pH, dissolved oxygen (DO, mg L⁻¹), and oxidation reduction potential (ORP, mV) with a YSI® 600QS Multiparameter Sonde (Yellow Springs, OH). Fecal indicators, coliform and generic E. coli, were tested by Quanta-Tray. HOBO Micro was set up to record the weather information.

Objective 2: Three representative broiler farms on ESV were selected for the detection of Salmonella spp. In each farm, three chicken litter samples (500 g) of composted chicken litter were collected monthly during the project. Four representative producers/factories in Virginia, West Virginia, or North Carolina were selected for the detection of Salmonella spp. Fourteen farms applied with chicken litter on ESV were also selected for the detection of Salmonella spp. monthly in 2015 after fertilization. Salmonella were detected by the MPN method mentioned above.

Results

?Prevalence and population of Salmonella enterica spp. in irrigation pond and water of four farms on the ESV were tested weekly since Jan. 2015. There were spatial (pond) and temporal (monthly) differences for Salmonella occurrence in surface pond water. The prevalence of Salmonella spp. in tested four ponds of farm A, B, C and D are 18.4%, 12.3%, 24.5% and 22.5%, respectively. The average MPN values of Salmonella in the four ponds during the 14 months are 0.43, 0.28, 0.75 and 1.82 MPN/L, respectively. Salmonella level in September especially in pond water of farm D is significantly higher than that water samples ($P < 0.05$). Salmonella occurrence increased compared with 2014 except pond D. Similarly, the bacterial concentration increased compared with 2014 except Pond B. There was no significant correlation between tested water parameters and Salmonella population in the surface pond water ($P > 0.1$).

All wells of tested except farm B are Salmonella positive at certain time points, especially in farm D. The prevalence (< 6.12%) of Salmonella in Well water is significantly lower compared with Pond, with average MPN values range from 0 to 0.109 MPN/L. Molecular serotyping and antimicrobial susceptibility test of isolated Salmonella spp. are underway.

Objective 2: No Salmonella was isolated from sampled composted poultry litter, poultry litter ash or biochar in 2015. Salmonella could survival for up to six months in poultry litter amended soils in sampled farms.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
604	Marketing and Distribution Practices
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #14

1. Outcome Measures

Pomace from Virginia-grown Grape Varieties as a Potential Source of Antioxidant and Antibacterial Compounds for Value-Added Application

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Grape pomace refers to the solid remains following pressing of grapes for juice or winemaking, and consists primarily of the skin, pulp, seeds, and stems. Large quantities of grape pomace produced annually, and it has been reported that over 16 million tons of grape by- products were produced in 2010. Currently, grape pomace is used mainly for animal feed, organic fertilizers. Grape pomace contains high level of polyphenols, great potential as a source of natural antimicrobials, antioxidants, and dietary fiber for food, pharmaceutical and cosmetic applications.

However, these properties may be affected by grape variety, environmental factors and agronomic practices. Currently, no information is available concerning the pomaces from grape varieties produced in Virginia.

What has been done

Researchers have conducted studies to (1) quantify the composition and concentrations of polyphenolic compounds in pomaces from four Virginia-grown grape varieties {Cabernet Franc and Chambourcin (red), Viognier and Vidal Blanc (white)}, and (2) assess their antioxidant and antibacterial activities to determine their potential as a source of natural antioxidants and antimicrobials. White grape pomaces had higher solvent extraction yield than red varieties. Cabernet Franc had the highest polyphenolic contents (total phenolics, total flavonoids, tannins, condensed tannins) and antioxidant capacities. All extracts exhibited antibacterial activity against *Listeria monocytogenes* ATCC 7644 and *Staphylococcus aureus* ATCC 29213, but not against *Escherichia coli* O157:H7 ATCC 3510 and *Salmonella typhimurium* ATCC 14028.

Results

Benefits to local grape producers and the wine industry include 1) Value-added utilization could increase profits to grape and wine producers; 2) Reduction in disposal costs and volume of waste stream. Benefits to other industries include 1) Use natural compounds in their product; 2) Reduce consumer risk and concerns about the synthetic compounds

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
723	Hazards to Human Health and Safety

Outcome #15

1. Outcome Measures

Increase knowledge of and intent to increase consumption of fresh produce to combat obesity and chronic disease

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	2400

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Eating the recommended amount of fruits and vegetables reduces obesity rates (Robert Wood Foundation, 2012). Yet, only one in 10 US adults eats the recommended amount. In 2015, CDC called for a "culture shift" of "widespread action" to change the average American diet to include 2 cups of fruit, and 3 cups of vegetables daily. "Substantial new efforts are needed to build consumer demand for fruits and vegetables through competitive pricing, placement, and promotion in child care, schools, grocery stores, communities and worksites."

What has been done

VSU Cooperative Extension's culinary expert taught adults to select, prepare, and cook easy and delicious meals and snacks using locally grown "Superfoods" many of which are considered specialty crops that small farmers in Virginia can produce and market to local consumers. In 2015, 30 "Superfoods" cooking demonstrations were conducted to teach adult learners about healthy eating and cooking behaviors to include more produce in daily diet to prevent obesity and chronic disease development. The cooking demonstrations included local grown crops.

Results

As a result of conducting "Superfoods" cooking demonstrations, 2,400 adults learned healthy eating behaviors they were able to use daily. After eating the prepared meals, 100% of participants agreed they would eat more fruits and vegetables, and that they were aware that they needed to eat five or more one cup servings (2 fruit; 3 vegetable) daily for obesity and chronic disease prevention. Participants received recipe cards and the majority stated their intention to cook the meals for themselves or families after the class. In some instances, class participants would contact Ms. Johnson with a testimony of "weight loss" or "lowered high blood pressure" or "lowered cholesterol. One testimony was of a woman who felt learning how to cook and eat healthy with local produce everyday was the reason she no longer had cancer.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #16

1. Outcome Measures

Breakfast at school: The role of time and place for participation and nutritional intake

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The federal School Breakfast Program (SBP), in which elementary school students receive free or subsidized breakfast directly at their school, has notoriously suffered from a lack of participation. In recent years, many schools have moved the location of service from the cafeteria to the classroom, using the first 10 minutes of instruction time for breakfast instead. While this change in implementation has been found to increase participation, it is also a lot more expensive than cafeteria service. To date, no reports of the separate roles of time and location on SBP participation and nutritional intake have been found. Disentangling these two effects is important to justify the high costs of classroom implementation.

What has been done

Virginia Tech researchers designed an experiment at three Nevada schools, where each cohort of children experiences SBP under three implementations: traditional cafeteria and schedule, cafeteria + 10 minutes, and classroom. With collaboration with nutritional experts and school staff, they collected daily information from each student on food intake at home, food preferences, hunger scale, arrival time, and mode of transportation. Using state-of-the-art econometric panel data methods, they estimated, in isolation, the effects of added time and change in location on breakfast participation and nutritional intake. While the field data was collected in 2011 and 2012, most of the statistical analysis was performed in 2015.

Results

Both interventions significantly increase participation, with the majority share of the effect attributable to the location change to the classroom. Specifically, the extra time allotment alone only produces a 10% increase in participation, while moving breakfast to the classroom boosts participation rates by an additional 50%. In contrast, neither intervention leads to significant changes in nutritional intake for the typical student. In addition, classroom implementation produces an increase in "double-dipping," where students eat breakfast both at home and at school. These findings raise additional questions about implementation strategies for effectively reaching the targeted populations.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #17

1. Outcome Measures

Relationship Between Food Price, Time and Energy

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

An ongoing debate in the literature is how to measure the price of food. Most analyses have not considered the value of time in measuring the price of food. Whether or not the value of time is included in measuring the price of a food may have important implications for classifying foods based on their relative cost and nutrition policy. The relationship of energy density and price is also debated. The purpose of this article is to compare prices that exclude time (time-exclusive price) with prices that include time (time-inclusive price) for 2 types of home foods: home foods using basic ingredients (home recipes) vs. home foods using more processed ingredients (processed recipes).

What has been done

Virginia Tech researchers calculated the time-exclusive price and time-inclusive price of 100 home recipes and 143 processed recipes and then categorized them into 5 standard food groups: grains, proteins, vegetables, fruit, and dairy. We then examined the relation between the time-exclusive prices and the time-inclusive prices and dietary recommendations. In addition, 4430 foods were analyzed to determine if the relationship between the price of the food and its energy density was spurious.

Results

For any food group, the processed food time-inclusive price was always less than the home recipe time-inclusive price, even if the processed food's time-exclusive price was more expensive. Time-inclusive prices for home recipes were especially higher for the more time-intensive food groups, such as grains, vegetables, and fruit, which are generally under consumed relative to the guidelines. Focusing only on the sticker price of a food and ignoring the time cost may lead to different conclusions about relative prices and policy recommendations than when the time cost is included. Over all 4430 foods considered, there was almost no statistical support for higher energy-dense food being cheaper than low energy-dense food. While economics certainly plays a role in explaining low nutritional quality, more sophisticated economic arguments are required and discussed.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #18

1. Outcome Measures

School community participation influences sugar sweetened beverage intake among Appalachian adolescents

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sugar-sweetened beverage (SSB) consumption among adolescents that exceeds the recommended eight ounces per day is an established determinant of childhood obesity and is associated with increased risk for chronic diseases. Adolescents living in the Central Appalachian region consume disproportionate amounts of SSB and thus, are at higher risk for associated diseases. To inform widespread uptake of effective interventions to reduce SSB intake among adolescents, a systematic understanding and consideration of the unique contextual factors that may influence sustained use of such intervention is warranted.

What has been done

A two-phase study was conducted in a small, rural town in Central Appalachia. Virginia Tech researchers adapted the SIPsmartER curriculum, a media literacy-based intervention, for an adolescent population (Kids SIPsmartER, which included additional components targeting public health literacy. During Phase I, a group of middle school students were recruited through a community advisory board to provide systematic feedback on the extent to which Kids SIPsmartER targeted desired theory-based constructs and was age- and culturally- appropriate. During Phase II, the adapted intervention was tested for limited-effectiveness at reducing SSB using a two group, randomized controlled feasibility design at one middle school, also selected as a result of established relationships with the community advisory board.

Results

Of 90 eligible students, 76 (84%) provided parental consent, and 74 were present for baseline assessments. Three of the five classrooms (n=43) were randomized to receive Kids SIPsmartER and two classrooms (n=31) received a matched contract comparison program targeting physical activity. There was a significant within-group decrease of 9.3 ounces of SSB among Kids SIPsmartER participants. Comparing change scores of the sample present-at-follow up (n=72), there were no statistical difference in SSB ounces between the two groups. For the subgroup that

consumed more than 8 ounces of SSB at baseline (n=64), the difference approaches significances (p=0.08) with a small effect size (Cohen's d=0.46). There were significant between group differences for implementation intentions and media literacy (p<0.05) and trends toward differences between groups for behavioral intentions, subjective norms, and public health literacy (0.05<p>0.10). The high rate of consent and teacher, student and staff feedback indicates that the program was desired and lessons were satisfactory in terms of content and delivery. This study established limited effectiveness, acceptability, and practicality of Kids SIPsmartER, and informed development of a larger study with the potential to produce large scale, replicable reductions in SSB intake.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

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

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The Centers for Disease Control and Prevention estimate that each year 1 in 6 Americans get sick, 128,000 are hospitalized and 3,000 die from foodborne illness. The cost to the public is high, with an economic cost of \$77.7 billion dollars per year, or \$1626 per foodborne illness case. Between 2009 and 2013, the state of Virginia averaged 302 confirmed cases of foodborne illness (sick individuals) per year. For each confirmed case there are an estimated 20-38 unconfirmed cases. Therefore, between 6,044 and 11,476 Virginians suffered from foodborne illness each of those years. The estimated economic loss from foodborne illness in Virginia during those years may be between 9.8 and 18.7 million dollars per year. The top factors which contribute to foodborne illness are: inadequate cooking, improper holding temperatures, contaminated equipment, poor personal hygiene and food from unsafe sources. Safe food handling and preparation by food handlers can dramatically reduce illness and health costs.

In 2015 VCE conducted food handler trainings in 64 county (ies) including:

- 44 manager food safety certification courses (16 hour nationally recognized certification program) were provided to 716 individuals from the food service industry, schools, senior and day care centers.

- 39 employee food safety certification courses (6 to 10 hour trainings) were provided to 643 individuals were food handlers preparing foods in non-supervisory roles
- 31 general safe food handling and preparation courses were provided to 545 individuals. These included consumers preparing foods in their homes, individuals from non-profit organizations such as church, civic groups and public service organizations preparing food occasionally for the public. Over 503 restaurants, schools, day care centers, churches, civic groups, public service organizations and other locations sent individuals to VCE to complete food safety training.

Food handler trainings were evaluated to determine the knowledge and behavior changes of participants. Of those completing the nationally recognized certification training 81% became certified. Pre and post evaluations were conducted with all participants and 99% increased their knowledge of food safety practices.

30 participants responded to a follow-up survey. Of respondents, 100% adopted at least one new food safety behavior including,

- 93% improved time and temperature practices
- 53% made changes to prevent food contamination
- 93% made changes to personal hygiene practices

It is conservatively estimated that if one case of foodborne illness is prevented per food handler completing proper food safety training delivered through VCE across the state, there is a potential annual savings of approximately 3.1M dollars for the state of Virginia. This savings is calculated from the estimated economic burden of foodborne illness.

As part of the NIFA-AFRI-USDA Appalachian Foodshed Project (AFP), an interdisciplinary team of faculty, graduate students and community partners engages in collaborative scholarship efforts. This NIFA grant (Enhancing Food Security by Cultivating Resilient Food Systems and Communities) is evaluating how to increase food availability and access to communities in the Appalachia regions of VA, NC and WV. Community Food Security Assessments engaged 100+ stakeholders. County profiles were generated. Food systems model entered the validation stage. A graduate course (Food Security & Resilient Communities) was developed and taught, grounded in experiential learning & innovative pedagogical methodologies. eXtension Community of Practice, Community, Local & Regional Food Systems (CLRFS) was developed with other NIFA projects, academics and community practitioners. Practitioner interviews (n=48) were completed, transcribed, and edited from across the region and analysis is underway.

Key Items of Evaluation

30 participants responded to a follow-up survey. Of respondents, 100% adopted at least one new food safety behavior including,

- 93% improved time and temperature practices
- 53% made changes to prevent food contamination
- 93% made changes to personal hygiene practices

It is conservatively estimated that if one case of foodborne illness is prevented per food handler completing proper food safety training delivered through VCE across the state, there is a potential annual savings of approximately 3.1M dollars for the state of Virginia. This savings is calculated from the estimated economic burden of foodborne illness.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Natural Resources, Environment, and 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%	0%	30%	0%
111	Conservation and Efficient Use of Water	5%	0%	5%	0%
112	Watershed Protection and Management	10%	0%	20%	0%
123	Management and Sustainability of Forest Resources	20%	10%	15%	0%
124	Urban Forestry	5%	40%	5%	0%
125	Agroforestry	10%	50%	0%	0%
131	Alternative Uses of Land	10%	0%	0%	0%
133	Pollution Prevention and Mitigation	5%	0%	0%	100%
135	Aquatic and Terrestrial Wildlife	8%	0%	10%	0%
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	0%	0%	5%	0%
403	Waste Disposal, Recycling, and Reuse	10%	0%	0%	0%
605	Natural Resource and Environmental Economics	7%	0%	10%	0%
Total		100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	37.8	2.0	51.2	1.0
Actual Paid	38.9	1.0	58.4	2.0
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
861311	219158	767657	193898
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1287457	219158	1687212	160331
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2507611	134195	10579106	99616

V(D). Planned Program (Activity)

1. Brief description of the Activity

Primary outputs from this program include the following: developing and delivering educational programs such as short courses, workshops, field days and tours, seminars, conducting applied research and link with extension, develop and maintain demonstration areas, developing collaborative partnerships with government officials, state agencies, non-governmental organizations, developing and disseminating educational materials such as extension bulletins, journal articles, conference proceedings, webinars, trade journal articles, DVD's, and developing and maintaining web based educational materials such as short courses, web sites, discussion boards.

2. Brief description of the target audience

Farmers, forest owners, loggers, Christmas tree growers, youth, homeowners, mill owners and workers, private consultants and companies, local **and national** governmental officials, **scientists and extension educators**, private landowners, waste water treatment operators, state and federal agencies, nongovernmental organizations, professional associations and societies, and community groups.

3. How was eXtension used?

Information is shared and supported by involvement in several COP's. For example: Forest Farming eXtension Community of Practice - This project uses eXtension to create a national virtual community to synthesize and deliver synchronous and asynchronous forest farming educational programs, encourage and inform forest farming initiatives, compile comprehensive forest farming data, incorporate cutting-edge technology, and equitably address social and biophysical variability. eXtension's optimization metrics capture the community's characteristics, resources, behaviors, and activities. Wood Products Community of Practice- Web site: http://www.extension.org/wood_products Description: The goal of the Wood Products CoP is to disseminate knowledge on the design, production, management, marketing, and environmental impact of wood products to small and large wood products manufacturers. Geospatial: Map@syst - Map@Systis a community of practice devoted to the outreach and education for geospatial technologies and their application to today's world. The Map@syst community provides information on using geospatial technologies and how geospatial technologies are making a difference in peoples' lives. may@syst is responsible for the Geospatial Technology resource area within eXtension. Other COP involvement includes: Climate, Forests and Woodlands, Drinking Water and Human Health, Land Use Planning, Sustainable Marine Fisheries, Urban Forestry and Energy Conservation, Wood Energy, and Wildlife Damage Management.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	200939	265260	91208	7606

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

Patent Applications Submitted

Year: 2015

Actual: 1

Patents listed

Compositions and methods comprising Colletotrichum for controlling plant species

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	129	265	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational programs offered.

Year	Actual
2015	720

Output #2

Output Measure

- Number of educational materials and curricula developed

Year	Actual
2015	248

Output #3

Output Measure

- The amount of competitive grant funding received.

Year	Actual
2015	4772454

Output #4

Output Measure

- Identifiable impacts reported by agents/specialists

Year	Actual
2015	172

Output #5

Output Measure

- Number of counties where drinking water clinics are held.

Year	Actual
2015	50

Output #6

Output Measure

- Number of participants in drinking water clinics.

Year	Actual
2015	4182

Output #7

Output Measure

- Number of drinking water samples tested.

Year	Actual
2015	1726

Output #8

Output Measure

- Number of extension agents, volunteers and agency collaborators trained through the Virginia Master Well Owner Network.

Year	Actual
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2015 30

Output #9

Output Measure

- Number of educational contacts made by VAMWON volunteers and the state coordinator.

Year	Actual
2015	4423

Output #10

Output Measure

- The number of programs for landowners which address the impacts of Best Management Practice implementation and riparian buffers on water quality.
Not reporting on this Output for this Annual Report

Output #11

Output Measure

- The number of SHARP Logger Programs which address the impacts of Best Management Practice implementation and riparian buffers on water quality.

Year	Actual
2015	4

Output #12

Output Measure

- The number of workshops for small woodlot owners which emphasize the importance of small lots, non-timber forest products, and resources available to help owners of small lots.

Year	Actual
2015	3

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase in the number of individuals who gain knowledge as certified nutrient management planners.
2	The general public, landowners, and loggers use the forest in alternative and traditional ways to increase value and profit.
3	Licensed water well drilling contractors partner with VAHWQP to provide well inspections to homeowners, leading to homeowners having an improved understanding of their systems' function and awareness if systems need remediation or repair.
4	Private water supply users better understand water system design and function, test their water, and take recommended actions to protect and improve their water systems.
5	Private landowners obtain a written management plan from a natural resource professional before initiating forest management practices and implement at least one BMP.
6	Logging professionals protect water quality during logging operations by properly implementing all appropriate BMPs and maintaining riparian buffers.
7	Small lot owners adopt stewardship practices that enhance ecosystem services of their properties.
8	Researchers are calibrating the performance of a common watershed model for estimating water quality to allow the prediction of water quality at the watershed scale.
9	Research into climate change adaptation techniques for vegetable producers will result in concrete recommendations for the use of strip tillage as a climate change adaptation strategy in the United States and abroad.
10	Investigating sorghum production in response to climate change and market shifts
11	Master Naturalist Volunteers Contribute to Natural Resource Education and Conservation in Virginia
12	Integrating the soil microbiome into models of forest ecosystem function

Outcome #1

1. Outcome Measures

Increase in the number of individuals who gain knowledge as certified nutrient management planners.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	26

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia currently has nutrient management Standards and Criteria and corresponding Turf and Landscape Nutrient Management Planner training and certification programs administered by the Virginia Department of Conservation and Recreation (DCR). This program, initiated in 2009, was developed through a collaborative effort between DCR, Virginia Cooperative Extension, and Virginia Tech. The parties also collaborated in the development of a state/regional training manual to support the certification process in 2010. Standards and Criteria were updated in 2014, so these changes were incorporated into new presentations. The award-winning Urban Nutrient Management Handbook (recognized by both the American Society of Agronomy and the American Society of Agriculture and Biological Engineers) 13-chapter manual is published through Virginia Cooperative Extension. Personnel from Virginia Cooperative Extension, Virginia Tech, and DCR collaborated on spring and fall training sessions in 2015

What has been done

Personnel from VCE, Virginia Tech, and DCR collaborated on 2-day training sessions for 52 participants in spring and fall training sessions of 2015 in Charlottesville and Midlothian, VA. The audience included turfgrass and allied green industry professionals, extension agents, and Master Gardener Volunteers desiring to become certified plan writers in 2015.

Results

Of the 52 participants in the urban nutrient management training program, 26 new urban nutrient management planners were certified in 2015. An additional 4,557 acres of turf under an Urban Nutrient Management Plan was added from these and previously certified trainers that came through this program (137 prior to 2015). Total Urban Nutrient Management Plan acreage is 36,051.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #2

1. Outcome Measures

The general public, landowners, and loggers use the forest in alternative and traditional ways to increase value and profit.

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
2015	215

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Forestry is the third largest industry in Virginia. It contributes over \$17 billion a year to the economy. Our woodlands also provide clean water and air, plant and wildlife habitat, scenery and recreational opportunities, and soil protection and enhancement. The annual value of these environmental benefits is estimated to be \$21.8 billion. Research into landowner decision making highlights the importance of planning, professional assistance, and peer influence to increase stewardship and sustainability while meeting society's demands for goods and services from the woods.

Most Virginia woodlands (68%) are owned by private families. An aging ownership and rapid turn-over of land results in constantly changing ownership. While most owners claim a conservation ethic, few have knowledge & experience to recognize & implement sustainable woodland management practices, such as planning and seeking professional assistance.

What has been done

To reach these new landowners, the VFLEP and the Virginia Department of Forestry developed the Forest Landowner Weekend Retreat Program. This day-and-a-half program combines

classroom, field, and hands-on learning experiences to introduce landowners to basic forest management concepts, skills, and natural resource professionals.

Over 215 landowners have attended one of our ten Retreats. The average ownership size of attendees is 90 acres. As a result of attending a Retreat, exit surveys indicate that 10% intended on contacting a natural resource professional, 9% intended on obtaining a management plan, 5% planned on controlling invasive species on their land, and 5% intended on harvesting timber.

Results

Over 80% of the respondents had created a list of woodland ownership goals since attending a Retreat. The most common ownership goals included: To protect or improve wildlife habitat (100%), To protect nature or biological diversity (92%), To enjoy beauty or scenery (85%), To protect water resources (85%), For timber products such as logs or pulpwood (85%),

Additionally, since attending a Retreat, 81% have met with a natural resource professional. The most commonly contacted natural resource professionals were Virginia Department of Forestry foresters (69%) and private consulting foresters (54%).

Fifty percent of Retreat participants obtained a written forest management plan. Since only 4% of landowners nationally have a written management plan, this is good news indeed.

Finally, participants implemented a number of sustainable forest management practices on their lands as a result of attending landowner weekend Retreats. These included: Improving wildlife habitat (63%), Cutting and removing trees for sale (50%), Eliminating or reducing invasive species (50%), Road construction or maintenance (50%)

Thirty-seven percent attended an additional landowner education program. Based on these results, the Landowner Weekend Retreats are far exceeding our anticipated mid-term outcomes, and appear to be providing Virginia's woodland owners with the tools they need to start implementing sustainable management practices on their land.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
131	Alternative Uses of Land
403	Waste Disposal, Recycling, and Reuse

Outcome #3

1. Outcome Measures

Licensed water well drilling contractors partner with VAHWQP to provide well inspections to homeowners, leading to homeowners having an improved understanding of their systems' function and awareness if systems need remediation or repair.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	15

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nearly one quarter (22%) of Virginians, or about 1.7 million people, rely on private water supply systems such as springs, wells, and cisterns for their household water. In many parts of Virginia, people who have previously used public water systems are moving to rural areas where private water supplies are the norm. Lack of knowledge about private water supply management and water quality issues may lead to system neglect and a lack of regular water testing, which can have serious implications for water quality, longevity of the water system, and ultimately, the health and safety of the families who rely on these systems.

What has been done

The Virginia Well Owner Network (VWON) is a capacity-building effort composed of Virginia Cooperative Extension (VCE) county Agriculture and Natural Resources (ANR) and Family and Consumer Science (FCS) agents, volunteers, and agency collaborators from Virginia Departments of Environmental Quality (DEQ) and Health (VDH). VWON members are trained in the proper design, management, and maintenance of private water supply systems during a day-long workshop. VWON trained VCE agents organize and conduct county-based Virginia Household Water Quality Program (VAHWQP) drinking water clinics with support from on-campus faculty in the Biological Systems Engineering (BSE) department, and serve as a local resource for clientele with household water quality concerns. Trained VWON volunteers and agency collaborators reach private water system owners in a variety of ways (e.g., speaking to local community groups, discussions with friends and neighbors). In 2015, we conducted one in-service VWON training for VCE agents in Prince George in March. We are in the process of developing online training materials for homeowners who wish to become Well Owner Network volunteers.

Results

A total of 15 people attended the VWON training held in Prince George; 14 Extension professionals and 1 participant (Virginia Department of Health) from outside the organization. Guest speakers included representatives from United States Geological Survey, Creason Well Company, and the Virginia Water Well Association. VWON is currently composed of 68 volunteers, 74 extension agents and 30 agency collaborators in 71 Virginia counties and 6 cities. In 2014, previously trained VWON VCE agents conducted 50 VAHWQP drinking water clinics reaching citizens in 74 counties. Samples were collected and analyzed from 1726 private water supply systems, serving an estimated 4,182 Virginians. The VWON state coordinator reported 3363 additional educational contacts, VWON volunteers reported 1,060 contacts, and the VWON-VAHWQP website received 6,300 unique visitors in 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #4

1. Outcome Measures

Private water supply users better understand water system design and function, test their water, and take recommended actions to protect and improve their water systems.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nearly one quarter (22%) of Virginia's population (1.7 million people) rely on private water supply systems, such as wells, springs and cisterns, for their household water. In the US, municipal water supplies are regulated under the Safe Drinking Water Act by the Environmental Protection Agency, which mandates regular testing and water treatment. Homeowners who use private water supplies are completely responsible for routine testing, system maintenance and addressing any water quality problems, should they exist. Lack of knowledge about private water supply management and water quality issues may lead to system neglect and a lack of regular water testing, which can have serious implications for water quality, longevity of the water supply system, and, ultimately, the health and safety of the families who rely on these systems.

What has been done

The Virginia Household Water Quality Program (VAHWQP) provides confidential water testing and educates private water supply users through county-based drinking water clinics. With Virginia Cooperative Extension agents, trained through the Virginia Well Owner Network (VWON), VCE faculty coordinate clinics in up to 60 counties per year. At a clinic kickoff meeting, participants receive water sampling kits and instructions. A day later, participants bring their water samples to a central location in the county. The samples are transported to Virginia Tech for analysis. Samples are analyzed for 12 chemical constituents and for the presence of total coliform and E. coli bacteria. Three weeks later, test results, an explanation of individual results, and

possible solutions to water problems, including water treatment options, are discussed with clinic participants at an interpretation meeting. This interpretation meeting is a critical value-added component unique to VAHWQP drinking water clinics.

Results

Fifty (50) drinking water clinics were held serving participants from 74 counties in 2015. This year, 1726 samples from private water supplies were tested, a 41% increase over 2014. The sampled systems provide water for 4,182 Virginians. Statewide, in 2015, about 40% of all samples did not meet the EPA standard for public systems for total coliform bacteria, 9% were positive for E. coli, and 15% of samples exceeded the recommended level for lead in water that had been stagnant in the plumbing system for at least six hours. Based on online clinic evaluations (total RR=20%), 78% of respondents reported attending the VAHWQP clinic interpretation meeting; 93% stated they believed they understood their test results. The most commonly reported, recommended action taken after clinic participation was shock chlorination (24%), followed by installing or improving the function of water a treatment device (19% and 13%, respectively), and performing maintenance on well (12%). Nearly 80% of clinic participants report having never tested their water previously or testing it only once before. Participation in a VAHWQP clinic is designed encourage subsequent, annual testing using a commercial lab. If delivered commercially, the value attributed to the 50 VAHWQP drinking water clinics offered in 2016 would be \$586,840. The cost to the 2015 participants was \$86,300, a cost savings of approximately 85%.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #5

1. Outcome Measures

Private landowners obtain a written management plan from a natural resource professional before initiating forest management practices and implement at least one BMP.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	110

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Forestry is the third largest industry in Virginia. It contributes over \$17 billion a year to the economy. Our woodlands also provide clean water and air, plant and wildlife habitat, scenery and recreational opportunities, and soil protection and enhancement. The annual value of these environmental benefits is estimated to be \$21.8 billion. Research into landowner decision making highlights the importance of planning, professional assistance, and peer influence to increase stewardship and sustainability while meeting society's demands for goods and services from the woods.

Most Virginia woodlands (68%) are owned by private families. An aging ownership and rapid turn-over of land results in constantly changing ownership. While most owners claim a conservation ethic, few have knowledge & experience to recognize & implement sustainable woodland management practices, such as planning and seeking professional assistance.

What has been done

To reach these new landowners, the VFLEP and the Virginia Department of Forestry developed the Forest Landowner Weekend Retreat Program. This day-and-a-half program combines classroom, field, and hands-on learning experiences to introduce landowners to basic forest management concepts, skills, and natural resource professionals.

Over 215 landowners have attended one of our ten Retreats. The average ownership size of attendees is 90 acres. As a result of attending a Retreat, exit surveys indicate that 10% intended on contacting a natural resource professional, 9% intended on obtaining a management plan, 5% planned on controlling invasive species on their land, and 5% intended on harvesting timber.

Results

Over 80% of the respondents had created a list of woodland ownership goals since attending a Retreat. The most common ownership goals included:

- ?To protect or improve wildlife habitat (100%)
- ?To protect nature or biological diversity (92%)
- ?To enjoy beauty or scenery (85%)
- ?To protect water resources (85%)
- ?For timber products such as logs or pulpwood (85%)

Additionally, since attending a Retreat, 81% have met with a natural resource professional. The most commonly contacted natural resource professionals were Virginia Department of Forestry foresters (69%) and private consulting foresters (54%).

Fifty percent of Retreat participants obtained a written forest management plan. Since only 4% of landowners nationally have a written management plan, this is good news indeed.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
133	Pollution Prevention and Mitigation

Outcome #6

1. Outcome Measures

Logging professionals protect water quality during logging operations by properly implementing all appropriate BMPs and maintaining riparian buffers.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Forests and the forest industry provide an economic impact of over \$17 Billion to Virginia's economy. Harvesting and transportation is a critical component for providing raw materials for forest industry and providing revenue to forest landowners.

Logging can be dangerous and is often listed as one of the most dangerous occupations in the US. Forest harvesting operations have the potential for environmental impacts, primarily related to erosion and sedimentation issues during harvests. Performing harvesting operations safely and sustainably is critical for workers and for the sustainability of forests.

What has been done

The Virginia SHARP Logger Program (www.SHARPllogger.vt.edu) provides training to loggers, foresters, and others in the forest industry. Participants must complete a core program to become a trained "SHARP Logger". After completing the core program, they must earn 12 hours worth of continuing education every three years. Trainings are coordinated through the CNRE Department of Forest Resources and Environmental Conservation and are offered at sites across Virginia. These trainings are hosted locally by Forestry & Natural Resources District Agents.

Results

A recent survey of all Virginia SHARP Loggers found that 62% of Virginia's logging business owners have made changes to their operations as a result of SHARP logger programs they have attended. When asked to describe the changes they made, the most commonly reported changes related to improvements in safety and improvements in implementation of Best Management Practices (BMPs) to protect water quality.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
133	Pollution Prevention and Mitigation

Outcome #7

1. Outcome Measures

Small lot owners adopt stewardship practices that enhance ecosystem services of their properties.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	371

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Land parcelization continues throughout Virginia with small acre properties becoming increasingly important to the overall environmental health of the Commonwealth. Seventy-three percent of Virginia's privately owned forestland is in ownerships of 10 acres or less, yet little assistance has been available to them. Additionally, most small acre owners are first-time landowners with little knowledge of the natural systems they value. Planning and professional assistance leads to better stewardship, however, smaller acreage owners are even less likely than larger acreage owners to have written plans or seek assistance.

What has been done

The varied backgrounds of small acre owners require the use of innovative and sophisticated communication methods to convey the benefits and responsibilities of owning forests. A publication entitled *The Woods in Your Backyard* (2006) was updated and published as a 2nd Edition in 2015 and serves as a self-guided manual and workbook targeting small acreage owners. Workshops for landowners and trained volunteers were initiated in 2007. Since then, 15 programs have been delivered in Extension's Northern District. The hands-on workshops require homework completion toward plan development. The aim is to equip small acreage landowners with a management planning tool and knowledge to implement practices.

Results

Of the 371 participants, representing 4713 acres, 59% plan to complete a written plan. According to exit evaluations, 76% intend to better manage natural areas and 58% plan to convert excessive

lawn to natural areas. Over 90% described in follow-up survey at least one action they plan to take in the next two months. Within two months, all participants began the planning processes and 10% completed a written plan for their property. The public value of these improved private properties exceeds \$ 3,289,674* annually in goods and services.

Additional unsolicited feedback shows a change in attitude and action to result in more natural area. One participant said, "We have begun many of the improvements. It is a particular pleasure for us to replace non-native plants with native species and we have been actively removing invasive species." Another participant has implemented practices to offer as a showcase to other owners. The site is regularly used for educational purposes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
133	Pollution Prevention and Mitigation

Outcome #8

1. Outcome Measures

Researchers are calibrating the performance of a common watershed model for estimating water quality to allow the prediction of water quality at the watershed scale.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Over the last 30 years agricultural intensification, subsequent fertilizer use and urban development have led to increased nutrient delivery to water bodies. Despite the fact that many coastal regions have made major commitments to reduce nutrient loading and reverse this trend of declining water quality and habitat conditions, estuaries around the world continue to experience hypoxia and deteriorating water quality. A major impediment to developing water quality improvement strategies is the complicating influence of climate change and variability. Large inter-annual fluctuations in river flow result in highly variable nutrient loading and large variations in plankton production and hypoxic volume. In addition, episodic wind events and

longer-term changes in water temperature exert more subtle and poorly understood controls on key biogeochemical processes. Thus, there is a critical need to quantify the processes controlling landscape export of nitrogen, phosphorus and sediment, particularly in response to climate change to protect increasingly vulnerable water bodies.

What has been done

A team of Virginia Tech researchers are developing a quantifiable, predictive framework that couples biogeochemical and hydrologic drivers of terrestrial nutrient export with climate change to evaluate the effects of ecosystem management on estuarine function and costs of water quality protection.

Results

To date we have climate data down-scaled for 4 of our test bed watersheds, which are also initialized (S. Fork of the Shenandoah in VA-Ag, WE-38 in PA-Ag, the Susquehanna in PA-Mixed, and Difficult Run In VA-Urban), and calibrated. We have also developed a new Greenhouse Gas (GHG) model to predict nitrous oxide emission from agricultural systems. The model has been tested in WE38 in PA and in Indiana. We have also developed an economic assessment model to quantify the tradeoffs between water quality BMPs and the costs needed to achieve the water quality goals. The model has been applied in WE-38 and Difficult Run.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #9

1. Outcome Measures

Research into climate change adaptation techniques for vegetable producers will result in concrete recommendations for the use of strip tillage as a climate change adaptation strategy in the United States and abroad.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Across the U.S., adoption of soil health management practices has often been piecemeal, provisional, or otherwise incomplete. In the mid-Atlantic region, producers growing crops such as tobacco, vegetables and farm forage often still rely on traditional plowing and land management practices. Even in cropping systems that have seen widespread implementation of conservation or no-tillage, the use of high-residue multi-species cover crops has been sporadic. Therefore, it is imperative to demonstrate and quantify the benefits and utility of integrated soil health management practices across a range of crops, soil types, and climates. This information is ultimately needed in order to enable and encourage producers to make management decisions specific to their own field conditions.

What has been done

A Virginia Tech research team, along with the Natural Resources Conservation Service (NRCS), has performed a research/demonstration project comparing four management practices: 1) disc tillage with no winter cover; 2) no-till with no winter cover; 3) disc tillage with a mixed-species winter cover crop; and 4) no-till with a mixed species winter cover crop. They are measuring soil physical, chemical, and biological soil characteristics and crop yields on five combined demonstration and research sites around Virginia, with an additional three demonstration-only sites within farmers' actively managed fields.

Results

The overall objective is to increase the acreage of land that is being managed using a combination of conservation/no-tillage and multi-species high-residue cover crops, by holding demonstration activities and by providing quantitative data that highlight soil health benefits of conservation agricultural practices. We have held one demonstration activity in October 2015 with a visiting group of agronomists and food supply chain managers (from the United Kingdom) where we demonstrated our cover crop mixtures and measurement methods. This project will continue over several years.

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

Outcome #10

1. Outcome Measures

Investigating sorghum production in response to climate change and market shifts

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Increasing global temperatures and a more frequent occurrence of below average rainfall as led to prevalence of soil moisture conditions that are sub-optimal for crop performance. To maintain current crop productivity under this unfavorable conditions, moisture stress tolerant crop varieties needs to be chosen for production. Sorghum (*Sorghum bicolor* (L.)) is a hardy cereal crop that produces good yield in environment where cereal like corn or wheat underperform. Sorghum increases its water-use efficiency under drought conditions and uses less fertilizer compared to corn. Based on the US Grain Council statistics, United States of America (US) is the world largest producer of grain sorghum, the country's third most important cereal crop. The US exports large quantities of sorghum to foreign markets, but there is increasing demand by local markets including as a corn substitute in feedlots. An emerging grain sorghum market is the brewing industry where it is gaining popularity in manufacture of beers. There is also a growing demand for sweet sorghum for bio-ethanol production by the expanding US bio-energy industry. The availability of such a huge market is an incentive to producers who might opt for sorghum production in order to reduce risk associated with emerging un-predictable rainfall patterns.

What has been done

Over the last few years, researchers at Virginia State University carried out trials and on sweet and grain sorghum to identify promising varieties for production near Chesterfield VA. Sweet sorghum stems are rich in sugars and extracted juice is used for bioethanol and for the manufacture of sorghum spirit like sorghum. Bagasse, a left-over material from juice extraction may provide alternative forage for ruminants. In grain sorghum, varietal differences in grain composition have potential effects on digestibility in animal rumen and fermentation characteristics for beer manufacture.

Results

The evaluation at Virginia State University Research and Demonstration Farm (has identified both sweet and grain sorghum with good yield potentials. The next phase of the research is to identify local processing facilities including breweries to ascertain the suitability of the identified varieties for use in the manufacture of their products. It is expected that the results from these industrial studies will form a basis for extension activities to popularize sorghum given these potential markets identified. In light of the Federal policy that has impacted tobacco profitability, farmers in the south-side Virginia are in need of alternatives low input multipurpose crop, and sorghum is a good fit.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water

Outcome #11

1. Outcome Measures

Master Naturalist Volunteers Contribute to Natural Resource Education and Conservation in Virginia

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Virginia Master Naturalist (VMN) program is a statewide corps of volunteers providing education, outreach, and service dedicated to the beneficial management of natural resources and natural areas within their communities. Public engagement is critical to successful conservation and management of Virginia's woods, wildlife, and waters. Every year, more than 500 Virginians become new VMN volunteers through training and service.

What has been done

The process for becoming a Certified VMN typically takes 6 to 12 months. One starts by completing a 40-hour basic training course offered by one of 30 local chapters of the program. An additional 8 hours of continuing education and 40 hours of volunteer service are also required to become certified or recertified. Volunteer service hours are recorded in four primary areas: education, stewardship, citizen science, and chapter administration. At the statewide level, the program is sponsored by seven state agencies, and on the local level, chapters partner with several hundred conservation and education organizations.

Results

The VMN program currently has 2,790 volunteer members, 1,681 of whom reported service hours in 2015. These volunteers completed 21,892 hours of continuing education in 2015. They also contributed significant volunteer time in the areas of education (27,959 hours), citizen science (35,782 hours), stewardship (26,532 hours), and chapter administration (20,684 hours). These

hours amount to more than \$2.75 million in contributions to natural resource conservation in Virginia (based on IndependentSector.org value of a volunteer hour.) Noteworthy projects in 2015 included a multi-site pollinator habitat planting project in the Shenandoah Valley, a citizen science study of the best ways to manage invasive stiltgrass in a longleaf pine ecosystem, and numerous nature programs for youth in partnership with 4-H and other organizations. Since the program's inception in 2005, VMN volunteers have contributed 646,979 hours of service with a value of \$3 million to the Commonwealth of Virginia.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry
131	Alternative Uses of Land
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
605	Natural Resource and Environmental Economics

Outcome #12

1. Outcome Measures

Integrating the soil microbiome into models of forest ecosystem function

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Soil microorganisms mediate or are directly responsible for a host of important ecological processes provided by forest ecosystems. Unfortunately, the link between soil microbiome diversity and ecosystem function is not well understood. In an earlier project, Virginia Tech

researchers in the Powell River Project discovered that soil microbial taxa did not shift in clear related patterns to the changes observed in ecosystem process rates such as gas fluxes and soil genesis. More advanced analysis of microbiome data is required to successfully integrate them into ecosystem models.

What has been done

The Virginia Tech research team is employing computational approaches derived from plant genomics to microbiome data at the ecosystem scale. These techniques have been developed to make linkages between complex data sets of plant genotype and phenotype. The team is using this approach for metagenomic data at the ecosystem level.

Results

Employment of new computational techniques has successfully been used to identify 'modules' of bacterial and fungal species that behave similarly and can be treated as operational clusters in the system. This clustering has two major benefits including: 1) Reduction of complexity inherent in microbiome data such that they can be more easily integrated into ecosystem models, and 2) identification of a new way to determine microbial ecotypes based on similar behavior within the system.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships

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

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Strengthening Virginia Families

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
801	Individual and Family Resource Management	55%	80%	0%	0%
802	Human Development and Family Well-Being	40%	20%	0%	0%
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	5%	0%	0%	0%
Total		100%	100%	0%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	17.3	2.0	0.0	0.0
Actual Paid	44.5	2.0	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
1055801	524394	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1578173	524394	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
3073846	125000	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

To address the Strengthening Virginia Families planned program, we will:

1. Conduct workshops in human development, parenting education, child care provider training, housing, and individual and family resource management
2. Deliver services in individual and family resource management
3. Develop print and electronic resources in human development, housing, and individual and family resource management
4. Provide and distributed available resources, including eXtension, in human development, housing, and individual and family resource management
5. Provide professional and volunteer development training in child care, parenting, and individual and family financial management
6. Provide counseling in financial management
7. Partner with local, regional and state agencies, organizations, faith-based groups, etc.
8. Facilitate meetings of task forces, coalitions, committees, addressing human development and financial management issues

and

2. Brief description of the target audience

Families, youth, individuals, older adults, adult home caregivers, child care providers and early childhood educators, providers of after-school care, community organizations, home owners and government officials, donors, K-12 educators, and volunteers.

3. How was eXtension used?

eXtension was used as a way to connect to Communities of Practice, online professional development training modules, connecting audiences to additional resources, and answering Ask an Expert questions.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	28877	54928	13834	1101

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	6	11	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of trainings, educational workshops, and on-line education sessions held in planned program are for targeted audiences.

Year	Actual
2015	515

Output #2

Output Measure

- Number of fact sheets, publications, newspaper articles, and curricula on strengthening Virginia families in human development and financial management.

Year	Actual
2015	144

Output #3

Output Measure

- The number of programs and one-on-one counseling sessions offered by Master Financial Education Volunteers.

Year	Actual
2015	862

Output #4

Output Measure

- Number of individuals and families attending sessions on basic financial management strategies such as budgeting, setting financial goals, establishing a saving/investing program, and implementing practices to reduce the chance for identity theft.

Year	Actual
2015	6118

Output #5

Output Measure

- Number of youth attending educational programs conducted on basic financial management strategies such as budgeting, setting financial goals, establishing a saving/investing.

Year	Actual
2015	10573

Output #6

Output Measure

- Number of program participants attending sessions on new ownership, avoiding foreclosure, purchasing and maintaining a home, and/or indoor air quality.

Year	Actual
2015	279

Output #7

Output Measure

- The number of volunteers completing training to become Master Financial Education Volunteers.

Year	Actual
2015	120

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Parenting Education - Increase the percentage of parenting education participants that indicate increased knowledge of effective parenting practices.
2	Child Care Provider/Early Childhood Training - Increase the percentage of early childhood professional development participants that indicate increased knowledge of core competency areas, such as basic child development, appropriate child observation and assessment, effective interaction strategies, and effective learning environments.
3	Adult Financial Management - Increase the number of individuals completing basic financial management strategies including budgeting, setting financial goals, establishing a saving/investing program.
4	Youth Financial Education - Increase the number of youth learning the basic financial management strategies such as budgeting, setting financial goals, establishing a saving/investing program after receiving financial instruction.

Outcome #1

1. Outcome Measures

Parenting Education - Increase the percentage of parenting education participants that indicate increased knowledge of effective parenting practices.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	90

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Virginia, every 10 days, a child dies from abuse or neglect. Most die in the care of their family. Every 83 minutes a Virginia child is abused or neglected; most are under the age of 5. Most abusers are family members; abuse is typically endured over a long period of time. In an average moment there are 4802 children in foster care in Virginia. There were 111 cases of founded abuse or neglect in Petersburg in 2013. Adapting to these problems have economic impacts for the individual family unit and the Commonwealth as a whole.

What has been done

To address these concerns, programs on effective parenting techniques, communication and positive discipline were delivered to 446 individuals. An eight week parenting workshop for DSS referred or court ordered parents was delivered four times, along with Parenting Lunch & Learn sessions, and monthly parenting meetings. Participants include Title I parents, and preschool public education programs, teen parents at Petersburg Public Schools, grandparents raising grandchildren, women in local domestic violence shelters care and military families.

Results

As a result of participating in the programs:

- 93% of parents increased knowledge in understanding child development
- 90% of parents increased knowledge of effective parenting practices
- 87% of parents increased knowledge in nurturing children
- 95% of parents increased knowledge in guiding children
- 93% of parents have adopted practices in guiding children
- 90% of parents will use community resources to meet their needs
- 97% of parents adopted practices to reduce family conflict and manage stress

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Child Care Provider/Early Childhood Training - Increase the percentage of early childhood professional development participants that indicate increased knowledge of core competency areas, such as basic child development, appropriate child observation and assessment, effective interaction strategies, and effective learning environments.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	96

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There are an estimated 599,000 children under the age of 6 in Virginia of which 62% are routinely cared for by someone other than their parents. Research shows that the first five years of life are crucial to children's long term cognitive, social and emotional development. Additionally, each dollar invested in high quality childcare and early childhood education returns \$7 to \$8 to society by reducing cost related to crime, special education and welfare by increasing revenues through improved employee productivity.

What has been done

To enhance the quality of early childhood care, three FCS Agents and four area child care professionals conducted an area-wide childcare provider training at New River Community College. One-hundred fifty-three participants from 15 counties representing family day care homes, childcare facilities, public school pre-K, Head Start and other groups attended. There were 10 family center based providers, 106 center-based providers and 23 other child care providers. Participants annually provide care to over 6,229 children.

Results

Program evaluations completed by 148 of the 153 participants showed: 100% understand the Conscious Discipline brain model.

- 100% can identify the three states that dictate emotional behavior.
- 100% learned ways adults' emotional states impact children's emotional states.
- 99% learned how to coach children through the Five Steps of Self-Regulation.
- 96% learned how to embrace and resolve conflict.
- 96% learned tips from other teachers and providers to enhance their programs.
- 95% learned new ideas for dealing with difficult people.
- 99% obtained new resources for classroom use.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Adult Financial Management - Increase the number of individuals completing basic financial management strategies including budgeting, setting financial goals, establishing a saving/investing program.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	6118

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The 2015 Consumer Financial Literacy Survey found that 75% of adults would benefit from advice and answers to everyday financial questions and 70% are currently worried about their personal finances. This same survey revealed that only 6% feel that their student loans were a good investment and of those who are currently repaying student loans, 58% mentioned they are unable to establish an emergency fund, retirement savings, or purchase a car due to the student loan repayments.

What has been done

To address this challenge, VCE delivered financial literacy workshops and one-on-one counseling sessions on an array of topics related to money management, understanding debt, credit,

homeowner preparation, bankruptcy education, etc. Partnerships continued to be enhanced with Department of Social Services, Department of Housing, community colleges, Volunteer Income Tax Assistance Sites, earned income tax sites, community organizations, correction facilities, as well as churches and businesses across the state.

Results

A total of 6118 adults attended one of 674 sessions. There was a dramatic increase in planned behavior based on surveys taken prior to the adult financial literacy programs and after them:

- 160% increase in those planning on writing short term financial goals
- 236% increase in those planning on writing a spending and savings plan.
- 249% increase in those planning on paying themselves first for savings.
- 240% increase in those planning on having an emergency fund.
- 200% increase in those planning on paying down debts.
- 240% increase in those planning on reviewing their credit report annually

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #4

1. Outcome Measures

Youth Financial Education - Increase the number of youth learning the basic financial management strategies such as budgeting, setting financial goals, establishing a saving/investing program after receiving financial instruction.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	593

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The 2015 Junior Achievement/The Allstate Foundation reported that 84% of teens look to their parents for money management information; however, 66% of parents do not discuss finances with their children. In 2015, 23%, of teens believed their parents do not spend enough time talking

to them about personal finances. Meanwhile, America Saves (2015) stated that while youth are aware that it is important to save, they don't know how to save.

What has been done

To address this concern, VCE delivered various programs to 10573 Virginia youth to increase the financial capacity of Virginia's youth. VCE offered Reality Store, Kids Marketplace, and Real Money Real World simulations, as well as Camp Millionaire. Each program offers hands-on learning and correlates to Virginia Standards of Learning and educational mandates.

Results

There were 24 Kids Marketplace simulations with an audience of 1931 children. Of those surveyed, 81% learned more about using money, 59% learned the importance of giving something up in the short run for something in the future, and 65% plan to talk to their parents about money.

A total of 96 Reality Store programs with an audience of 7,936 children were conducted. Of those surveyed, 86% stated the program increased awareness of making smart financial decisions.

There were 11 Real Money, Real World programs with an audience of 706 children. Of those surveyed, 84% indicated they will think through how spending impacts other opportunities and choices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

During this year, there was a decrease in FTEs assigned to this programming area. A key specialist retired and some competing demands at the local level have shifted emphasis to other issues at present. We anticipate a shift back given recent legislation regarding child care providers.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Women have unique financial needs. In 2008 less than half of working women participated in a pension or retirement plan, 13% of women age 75 and older live in poverty compared to 6% of men, 80% of custodial parents are women, 2/3 of women between ages 40 and 79 have dealt with a financial crisis, and on average women earn 71 cents for every dollar a man earns. In Arlington, of those who requested Virginia Cooperative Extension's one-on-

one financial counseling services in the past year, 87% are women.

Two five-week courses were offered in 2015. Courses were taught using the Money Talk: A financial course for women curriculum, a research-based program developed by faculty at Rutgers University. Topics covered are: financial basics, insurance, investing, retirement planning, and planning for future life events. Participants reported saving \$23,450. These data were collected via three-month follow-up surveys. Combined with figures reported from the previous Money Talk courses, participants have saved \$415,320. Participants also reported which of 14 actions they have taken as a result of the course. Out of the 22 survey respondents (a total of 74 people attended the courses), 100% have taken at least one action and 96% have taken at least two. The most popular actions included calculating personal net worth, checking their credit reports, reviewing features of their insurance policies, and investigating investing options available through their employers.

Key Items of Evaluation

Pre, post and distant post follow up to assess for lasting impact of knowledge gained and sustained behavioral change. A quantitative measure, namely here money save, provides a key indicator of the application of the information taught during the course.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

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
806	Youth Development	100%	100%	0%	0%
	Total	100%	100%	0%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	81.0	2.0	0.0	0.0
Actual Paid	96.9	2.0	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
2222738	356648	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
3322470	356648	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
6471255	95309	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Activities include leadership, civic engagement, 4-H camping programs (overnight and day), 4-H after-school programs, 4-H in-school programs, 4-H school enrichment programs, 4-H clubs (community and military), 4-H special interest programs, 4-H Cloverbud groups, district 4-H trainings, local

4-H trainings, home school education, online education and distance learning, and specialized trainings and workshops to qualify instructors and to educate trainers.

2. Brief description of the target audience

Youth between the ages of 5-19 and adults who serve as volunteers with the 4-H Youth development program.

3. How was eXtension used?

All 4-H professionals have been encouraged to set up an eXtension account to access the resources and Ask the Expert function to help assist them in their programming efforts.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	177663	349028	735285	468127

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	139	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of trainings, educational workshops, and on-line education sessions for VCE's targeted audiences

Year	Actual
2015	3308

Output #2

Output Measure

- Number of fact sheets, research projects, publications and curricula on youth development.

Year	Actual
2015	1209

Output #3

Output Measure

- Number of members enrolled in-school, after-school, community clubs, special interest activities, 4-H military programs, and camps.

Year	Actual
2015	75517

Output #4

Output Measure

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

Year	Actual
2015	96963

Output #5

Output Measure

- Number of youth engaged in Citizenship.

Year	Actual
2015	86388

Output #6

Output Measure

- Number of youth engaged in Healthy Lifestyles.

Year	Actual
2015	114362

Output #7

Output Measure

- Number of youth engaged in Healthy Living programs.
Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Number of youth engaged in 4-H Animal Science programming.

Year	Actual
2015	46575

Output #9

Output Measure

- Number of youth engaged in 4-H Communication and Expressive Arts.

Year	Actual
2015	28631

Output #10

Output Measure

- Number of youth engaged in 4-H Natural Resources and Environmental Education.

Year	Actual
2015	15655

Output #11

Output Measure

- Number of youth engaged in Plants, Soils, and Entomology.

Year	Actual
2015	18432

Output #12

Output Measure

- Number of youth engaged in 4-H Careers and Consumer Education programming.

Year	Actual
2015	10357

Output #13

Output Measure

- Number of youth engaged in 4-H Leadership and Personal Development.

Year	Actual
2015	50276

Output #14

Output Measure

- Number of youth and adults engaged in 4-H Character Counts! programming.

Year	Actual
2015	11042

Output #15

Output Measure

- Number of adults engaged in Volunteer Development programming.

Year	Actual
2015	9908

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	4-H Camping - Increase the number of 4-H youth, or parents of youth that report a positive change in responsibility and social development as a result of participation in a 4-H camp.
2	4-H Citizenship - Increase the number of 4-H youth participating as volunteers and through community service that demonstrate teamwork skills and community commitment.
3	4-H Foods, Nutrition and Health - Increase the number of 4-H youth participating in foods, nutrition, and health programs that demonstrate healthy living choices.
4	4-H Science, Engineering and Technology - Increase the number of 4-H youth that demonstrate increased knowledge, skills, aspirations, and attitudes in STEM programming.
5	4-H Animal Science - Increase the number of 4-H youth and adults participating in animal science programming that demonstrate increased knowledge of raising animals in a responsible, ethical, and economically viable manner.
6	4-H Communication and Expressive Arts - Increase the number of 4-H youth participating in communication and expressive arts programming that demonstrate increased self-efficacy in public speaking, presentations, visual arts, and performing arts.
7	4-H Natural Resources and Environmental Education - Increase the number of 4-H youth participating in natural resources and environmental education programs that demonstrate environmentally responsible behavior.
8	4-H Plants, Soils and Entomology - Increase the number of 4-H youth participating in plant, soils, and entomology programming that learn the interconnectedness of organisms and their environment.
9	4-H Careers and Consumer Education - Increase the number of 4-H youth that increase their awareness of potential career pathways through service learning programs, educational program, workforce development, and/or through the 4-H college fair.
10	4-H Careers and Consumer Education - Increase the number of 4-H youth that indicate increased knowledge/skills related to economic education and/or entrepreneurship.
11	4-H Leadership and Personal Development - Increase the number of 4-H youth that demonstrate leadership knowledge by participating in a leadership position on the club, county, state, or national level.
12	4-H Character Counts! - Increase the number of 4-H youth or parents of youth that indicate a positive change in behavior as a result of participating in 4-H Character Counts! programming.
13	4-H Adult Leaders - Increase the percent of adult 4-H volunteers participating in leadership and volunteer development who indicate increased knowledge and skill development in implementing 4-H programming.

Outcome #1

1. Outcome Measures

4-H Camping - Increase the number of 4-H youth, or parents of youth that report a positive change in responsibility and social development as a result of participation in a 4-H camp.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	12484

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Positive youth development focuses on targeting life skills that youth need to be successful, contributing members of society. The Community Network for Youth Development identifies development of independence skills as an important step in youth learning to be productive, connected and to navigate the world. In an increasingly structured and supervised environment, youth need opportunities to practice independence skills including decision-making, problem-solving and communicating with each other.

What has been done

"Independence is fostered through attending short term residential camping programs. Youth attending these camping programs develop independence by practicing decision making through daily programming activities, choosing schedules and making personal living choices. Problem-solving skills are enhanced through camp classes, living in a group environment and participating in group activities. Communication skills are addressed as youth work with teen and adult volunteers to develop activities, prepare team challenges and plan their day.

Results

Post camp surveys from the 2015 Junior Camping Program indicate that, statewide, campers ages 9-13 report increasing their independence as a result of attending 4-H camp by 13%. The survey also indicated a 14% increase in youth working as a team, a 13% increase in youth taking responsibility for their actions, and finally a 15% increase in youth expressing their opinion with others.

Out of a total of 333 randomly surveyed 4-H Jr. Campers in the Northern Virginia 4-H Educational Center's service area of 19 localities, 96% indicated they would return next year. What do these campers say after attending camp?

"...am responsible for my actions" 99% service area

"...able to make new friends" 98% service area

- "...make decisions for myself" 97% service area
- "...learned a new skill" 99% service area
- "...able to help others" 99% service area
- "...can express my opinions with others" 95% service area

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

4-H Citizenship - Increase the number of 4-H youth participating as volunteers and through community service that demonstrate teamwork skills and community commitment.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	86388

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Research shows that practices of youth development engage youth in active roles by viewing them as community resources rather than as passive recipients of services. 4-H Citizenship: Government is Us? A Civic Engagement Curriculum for Youth Groups (2007) ?explains that leadership development and civic engagement not only empowers youth but improves their motivation for positive changes such as academic performances and career development. The commitments to helping people and involvement in community groups have been associated with gains on achievement testing, school participation, and increased future career goals. By becoming more engaged in the community, young people may advance their academic success and career development.

What has been done

Citizenship Washington Focus (CWF) is a citizenship program conducted by the National 4-H Council for high school youth. For seven weeks during the summer, delegations of 14-19 year-olds from across the country attend this six-day program at the National 4-H Youth Conference Center, just outside Washington, D.C. This program gives participants hands-on opportunities to

learn and practice skills that promote "Better Citizens Today, Better Leaders Tomorrow". Participants learn by attending workshops, committees, field trips, and social events. The programs objectives are: to strengthen communication, leadership, and other citizenship skills on a national level; understand the importance of civic and social responsibilities as they relate to the development of better citizens and leaders; exchange ideas, practice respect, and form friendships with other youth from diverse backgrounds; and to experience hands-on learning using the historical backdrop of our nation's Capital, Washington, D.C.

Results

Virginia 4-Hers took part in this event and learned what they can do to be active in our political system. CWF provided opportunities for all teen leaders in strengthening communication, leadership, and other citizenship skills on a national level. Youth also revealed civic and social responsibilities as they relate to the development of better citizens and leaders. Teens were able to speak with Senator Timothy Kaine and Congressman Randy Forbes on Capital Hill Day. They also participated in tours at the Thomas Jefferson, WWII, Lincoln, Vietnam War, and Korean War Memorials.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #3

1. Outcome Measures

4-H Foods, Nutrition and Health - Increase the number of 4-H youth participating in foods, nutrition, and health programs that demonstrate healthy living choices.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	114362

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Childhood obesity is a problem that is facing Virginia and the nation. According the Centers for Disease Control and Prevention (CDC), approximately 17% of youth ages 2-19 are obese in the U.S. and according to the 2011-12 National Survey of Children's Health, 29.8% of Virginia's 10 to 17 year olds were overweight or obese and ranks Virginia 23rd highest in the country for

percentage of overweight or obese children. A 2009 study by the CDC found that the direct and indirect cost of obesity is as high as \$147 billion annually. It was also noted that obese patients spent an average of \$1,429 more for their medical care than did people within a normal weight range. That is a 42% higher cost for people who are obese. Obesity can have both immediate and long-term health effects such as cardiovascular disease, diabetes, bone and joint problems, heart disease, and stroke. Many youth today have diets that lack fresh fruits and vegetables and currently exceed recommendations for saturated fat and added sugars (Story et al., 2009). Research has shown that healthy eating and physical activity can lower the risk of becoming obese and developing obesity related diseases.

What has been done

"A remedy to this epidemic is to educate today's adolescents on healthy, inexpensive food preparation techniques to use at home. Thus, the Teen Cuisine program was developed by the Virginia Family Nutrition Program for low income youth in 2011 and revised in 2013.

Teen Cuisine is a skill-based curriculum that focuses on food preparation and safety. It includes six lessons, each lasting 90 minutes. It focuses on key components of the Dietary Guidelines for Americans, including MyPlate, the food label, sources of fat, whole grains, and nutritious snacks. In 2013, Virginia 4-H received a \$65,000 Youth Voice: Youth Choice 4-H Healthy Living grant to provide training and resources to 4-H and Family and Consumer Science Extension Agents throughout Virginia who serve low-income audiences.

In 2014 Virginia 4-H was awarded a second grant of \$45,000 and programming for that grant began in September and was completed in April 2015. In September the grant was renewed for \$35,000 and programming began that will last through August 2016.

Results

Through interdisciplinary programming (4-H, FCS and FNP) together we reached a diverse group of over 12,000 youth between the ages of 12-19 in 2015. Students completed either a pre-post evaluation, as required for the Family Nutrition Program staff, or the 4-H Common Measures Healthy Living post-test as required by the Youth Voice Youth Choice grant. 370 Common Measure evaluations were completed for the 7th-12th grade participants. As a result, based on these post-tests evaluations, teen participants reported a variety of positive dietary impacts.

90% indicated that as a result of Teen Cuisine they learned about healthy food choices and the importance of nutrition in planning meals and snacks.

73% indicated that as a result of Teen Cuisine they are making healthier food choices and cooking with their families.

68 % indicated that as a result of Teen Cuisine they are changing behaviors to eat more healthy.

This translated into:

78% reporting that they ate more fruits and vegetables

?67% more whole grains

?61% less junk food

?64% less saturated fat

?67% indicated they drank less soda

?80% more water

In terms of food preparation and cooking skills:

?91% reported that they washed hands before they cooked

?86% reported improved knife skills

?78% reported using recipes when cooking

?74% indicated that they cooked more

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #4

1. Outcome Measures

4-H Science, Engineering and Technology - Increase the number of 4-H youth that demonstrate increased knowledge, skills, aspirations, and attitudes in STEM programming.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	96963

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Although Virginia's NAEP average scale scores in math and reading are above the national average, science scores have gone down. Increased understanding of science concepts,

especially at the elementary and middle school levels, is needed. Virginia 4-H is uniquely positioned to provide youth connections to caring adults, passionate professionals and opportunities for sustained and deepened learning of science concepts and practice of science skills.

What has been done

The 4-H Agent, 4-H Youth Development Program Associate and adult volunteer leaders in Hampton City provided STEM programming to youth ages 5-19 in the areas of electricity, digital and video media and science experiments. Programs are conducted through various delivery modes such as; clubs, camps, military clubs, school enrichment, and after-school programs. Also, The Hampton 4-H Program has partnered with NASA to provide programs to at risk youth in the Hampton School system.

Results

As a result of participating in the Hampton 4-H STEM programs, participants reported the following knowledge and skills gains:

90% of youth who increased knowledge in STEM

95% of youth who increased skills/abilities in STEM

As a result of participating in 4-H STEM educational programs, participants reported the following interest in STEM Learning:

90% of youth who improved awareness of the purpose of STEM in society, 95% of youth who increased interest in learning about STEM in everyday life, 90% of youth who improved understanding and appreciation of STEM in society STEM in their lives, 96% of youth who increased engagement in science learning in class participation, after-school programs, military clubs and events 90% of youth who reported increased innovation in applying STEM to address local/societal issues.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #5

1. Outcome Measures

4-H Animal Science - Increase the number of 4-H youth and adults participating in animal science programming that demonstrate increased knowledge of raising animals in a responsible, ethical, and economically viable manner.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	46575

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

As fewer youth live on farms and in rural settings, opportunities to learn about the origins of food and the importance of agriculture and natural resources in Virginia's economy have decreased. With urban sprawl, children also have fewer opportunities to learn about the environment through experiences in nature. Finally, childhood obesity is a growing problem in our country, so children need opportunities to learn about healthy lifestyle choices. Virginia Tech is in close proximity to many New River Valley schools and can provide many resources (facilities, access to hands-on learning, faculty expertise, etc.) that can help address these needs. Students who visit Virginia Tech's campus also have the opportunity to learn more about the university and two of its colleges.

What has been done

Extension staff from Botetourt, Craig, Floyd, Giles, Montgomery, and Pulaski counties, and Virginia Tech staff from the College of Agriculture and Life Sciences and the College of Natural Resources collaborated to provide a 4th grade program for New River Valley youth that would provide instruction in the areas of Agriculture, Foods and Nutrition, and Natural Resources. The program was held at the Alphin-Stuart Livestock Arena on the campus of Virginia Tech. Students from Floyd, Giles, Montgomery and Pulaski counties participated in nine workshop sessions including: Animal Sciences, Dairy Sciences, Horticulture, Poultry, Foods and Nutrition, Virginia's Geographic Regions, Recycling, Project Learning Tree, Project WILD, Fun & Games, and Horse Demonstration.

Results

Over 1,122 youth and teachers from the four counties participated in the 2015 4-H Junior Hokies Showcase. Following the program, teachers were asked to complete a survey assessing the success of the program. Twenty-six (26) teachers completed surveys. Ninety-seven percent (97%) rated their overall experience with the showcase as 'Excellent or Good.' Ninety-six percent (96%) likewise reported that the program correlated well to 4th grade SOL's and was useful and engaging to their students. Equally rewarding, 96% said they would return with their students next year. All workshops rated between 97-81% as 'Excellent to Good.' When asked what they liked best about 4-H Junior Hokie Showcase, one teacher wrote: "I really liked that all of the students were engaged at most stations. I also liked how the stations correlated with science SOLs." Another teacher wrote: "Organized, organized, organized."

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #6

1. Outcome Measures

4-H Communication and Expressive Arts - Increase the number of 4-H youth participating in communication and expressive arts programming that demonstrate increased self-efficacy in public speaking, presentations, visual arts, and performing arts.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	28631

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Youth need to learn to organize thoughts and ideas and express them clearly and effectively when speaking and writing. Communication skills are critical to success in the workplace and are ranked first among a job candidates ?must have? skills and qualities, according to a 2010 survey by the National Association of Colleges and Employers. The Virginia Standards of Learning for Public School systems has included presentations,demonstrations and public speaking as skills that students need to achieve.

What has been done

With endowed scholarship funds as an incentive the Communication and Expressive Arts program in Hanover County provides members the opportunity to not only participate in traditional 4-H competitions but also PowerPoint and essay writing. Competitions are held on a monthly basis so youth have multiple opportunities to participate in the required four contests. With the district contest included they have eight possible venues to compete.

Results

67 youth participated in one or more of the communications contests. Twenty-seven competed in at least four contests, thus qualifying as Weiner Scholars for 2015. Three graduating youth received their scholarship funds of over \$1000. Three youth in their third year of the program stated they do really well in school when doing presentations. While their classmates are scared to get in front of the class, they are not. Teachers have made comments on how well they present in front of an audience. Another youth said this was good preparation for a planned career as a lawyer.

4. Associated Knowledge Areas

KA Code **Knowledge Area**
806 Youth Development

Outcome #7

1. Outcome Measures

4-H Natural Resources and Environmental Education - Increase the number of 4-H youth participating in natural resources and environmental education programs that demonstrate environmentally responsible behavior.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	15655

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

As technology becomes more integrated into everyday life, youth are becoming less active outdoors and spending more time with video games, computers, and cell phones. These youth are thus less knowledgeable of natural resources related information and how it affects their personal lives and the lives of those around them. The term "nature-deficit disorder" was coined by author Richard Louv in his book "Last Child in the Woods" to describe what happens to young people who become disconnected from their natural world. Louv links this lack of nature to some of the most disturbing childhood trends, such as the rises in obesity, attention disorders, and depression. The "No Child Left Inside" Act recognizes this as a problem on a National scale.

What has been done

The 4-H Natural Resources Weekend offered 22 hands-on workshops and demonstrations primarily conducted in outdoor settings that address topics related to natural resources such as wildlife and fisheries, forestry, shooting education, and outdoor recreation. Youth and adult participants alike have the opportunity to be active outdoors while learning research-based facts about the environment. This two-day event involves 20 instructors including 4-H and Agriculture Extension Agents, Forestry and Natural Resources Extension Specialists, Master Naturalists, Department of Forestry personnel, and 4-H volunteers who educated over 60 youth and adults about natural resources.

Results

As a result of participation in the State 4-H Natural Resources Weekend, Survey respondents listed 80 new skills or knowledge learned from participation in the weekend event such as the

how to use a GPS, how to make venison jerky, how to identify trees in winter, the importance of eye dominance when shooting, how animals communicate, and how to identify animal tracks. Participants described 4-H Natural Resources Weekend as "very hands-on, interactive and fun"; "lots of good learning to be had and many good things to witness for the first time"; "it teaches you the importance of nature and how you can help preserve it." Sixty percent of evaluation respondents indicated that the Natural Resources Weekend changed the way they think about natural resources.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #8

1. Outcome Measures

4-H Plants, Soils and Entomology - Increase the number of 4-H youth participating in plant, soils, and entomology programming that learn the interconnectedness of organisms and their environment.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	18432

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Youth may not be aware of how they contribute to environmental pollution. Providing hands-on experiential learning on the sources of environmental pollution during elementary school may create a lasting impression on the personal impact individuals have on protecting the natural environment.

What has been done

Conducted educational environmental workshops with hands-on activities to teach about sources of environmental pollution and ways to reduce pollution at Virginia State University Randolph Research farm in Petersburg, VA.

Results

As a result of on-farm trainings conducted at Virginia State University Randolph Research farm in Petersburg, VA, over 800 3rd, 4th and 5th graders learned about the sources of environmental pollution and increased awareness of personal ways to prevent environmental pollution.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #9

1. Outcome Measures

4-H Careers and Consumer Education - Increase the number of 4-H youth that increase their awareness of potential career pathways through service learning programs, educational program, workforce development, and/or through the 4-H college fair.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	10357

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Positive youth development focuses on targeting life skills that youth need to be successful, contributing members of society. The teaching of such skills is often overlooked in schools, as standardized lessons are the norm. 4-H programming teaches leadership, citizenship, and life skills such as decision making, problem solving, and communication. In particular, 4-H can teach youth skills that are needed to help them become competitive in their respective fields of employment, after graduating high school. These skills, such as career preparation and public speaking, can help youth stand out from the crowd as they seek employment or other opportunities at the end of their high school career.

What has been done

A program was developed for the 8th grade AVID students at JL Simpson Middle School. AVID stands for "Advancement Via Individual Determination" and is for students who have college potential, but may need lots of support to get there. The program took place over three months and consisted of career exploration, public speaking, and a speed interviewing event. The career exploration portion helped the participants engage in self-discovery and research career options that would be right for them. The participants also learned how to create a resume, and practiced their interviewing techniques with their peers. In

the program on public speaking, the youth learned tips on preparing to speak in front of an audience. The public speaking portion concluded with a competition--all youth earned a blue, red, or white ribbon, and two overall winners were selected. In the final portion, the students were able to demonstrate the skills they learned in a Speed Interview Event. This event was staffed by volunteers representing various careers in Loudoun County. The event was well received by both the students and the volunteers.

Results

Across all categories, more than 70% of the students indicated that they agreed that the program helped them improve their life skills, particularly in the areas of organizing a presentation, delivering a presentation, and in public speaking skills. In addition, the teacher who collaborated on the program indicated it was successful for the students as well. She noted that the program increased student confidence; made students think creatively and develop a plan for their presentation; taught students dos/don'ts of public speaking; established a relationship between 4H representative, AVID teacher, and students; and provided students with feedback after presentation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #10

1. Outcome Measures

4-H Careers and Consumer Education - Increase the number of 4-H youth that indicate increased knowledge/skills related to economic education and/or entrepreneurship.

Not Reporting on this Outcome Measure

Outcome #11

1. Outcome Measures

4-H Leadership and Personal Development - Increase the number of 4-H youth that demonstrate leadership knowledge by participating in a leadership position on the club, county, state, or national level.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Leadership Development for teens has been an ongoing purpose and challenge. It has been addressed through various youth organizational programs, such as those like 4-H and FFA, but is generally context dependent and geared toward youth with similar interest or access to specific programs. Engaging and developing outstanding teens is one way to begin identifying and addressing global issues facing communities throughout the Commonwealth. Further, a need was identified to better integrate motivated youth from both 4-H and FFA organizations under the pretense of collective capacity building.

What has been done

A core planning team was coordinated to envision, plan, and implement a new teen leadership program for Virginia. Funding for a program was made available through an endowment fund intended for youth leadership development. The result of multiple discussions and input of expertise based on an available budget was the Teen Excellence in Leadership Institute (TELI). Outstanding teens (ages 15-18), nominated by their 4-H agent or FFA Advisor/Agriculture teacher, were eligible to apply through a competitive process. The three-part institute design included two in-person weekend events and a virtual meeting for project update reports. Institute goals include: 1) understand self and develop a personalized action plan for engaged leadership, 2) network with other teens interested in learning about issues facing youth and communities, 3) design a team project to address community leadership needs in Virginia, 4) learn more about advocacy and outreach that will improve the lives of others. Topics covered in the program are to include, but not be limited to: Strengths-Based Leadership, Problem Solving Style, Group Facilitation Skills, Adult-Youth Partnerships, Team Building, Project Collaboration, Peer Feedback and Evaluation, Leadership Principles, Etiquette, and Critical Reflection.

Results

23 youth were accepted for full participation in the 2014-2015 TELI sequence. The institute convened in November 2014. The virtual meeting was held in January 2015 and the final weekend, including a project presentation and report to an invited panel of experts, was held in March 2015. Students worked in five project teams addressing issues such as low rates of youth involved in community organizations, education (including CTE), bullying, lack of community pride, and a need for increased club/chapter involvement. We were able to create a budget with increased participation fee and donor support that allowed us to offer TELI again for 2015-2016. The current group of 16, competitively selected, met in November 2015 for their first session. Two virtual sessions will be in January and February, with a closing weekend of training and project reports in April, 2016. The program was presented via poster at the National 4-H Conference in October in Portland, Oregon. Several other states (3 in the Southern Region; FL, SC, LA) are interested in replicating a similar program. Plans are in place to develop TELI curriculum as a VCE publication that could then be referenced and used in other states. The program was evaluated using the Citizenship Common Measures and found the mean scores before and after participation: I have a plan for reaching my goals - 2.80 before and 3.73 after; I like working with others to solve problems - 2.60 before and 3.33 after; I am able to lead a project that will make a difference in my community - 2.40 before and 3.73 after; After high school, I will continue to work to better my community - 2.93 before and 3.54 after.

4. Associated Knowledge Areas

KA Code **Knowledge Area**
806 Youth Development

Outcome #12

1. Outcome Measures

4-H Character Counts! - Increase the number of 4-H youth or parents of youth that indicate a positive change in behavior as a result of participating in 4-H Character Counts! programming.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	11042

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A continual parade of headline-grabbing incidents of dishonest and unethical behavior from political leaders, business executives and prominent athletes suggests that we are in a moral recession. However, a survey from the Josephson Institute of Ethics suggests that a robust recovery is underway. This survey, the Report Card of the Ethics of American Youth (2012), measures the self-reported values, attitudes and behaviors of over 23,000 high school students. Results reveal that for the first time in a decade students are cheating, lying and stealing less than in previous years. Even though this is a small ray of hope, it is pertinent that we continue implementation and delivery of a character education program for fostering youth's overall sense of well-being and positive development.

What has been done

The Virginia 4-H CHARACTER COUNTS! program helps youth sort right from wrong and encourages them to use universally accepted values to strengthen their character. The national program, developed by the Josephson Institute of Ethics and adopted by Virginia 4-H, teaches trustworthiness, respect, responsibility, fairness, caring and citizenship as the six pillars of character. Age appropriate games, role playing, discussion, reflections, and real world examples make these character values understandable.

Results

In 2015, the Virginia 4-H CHARACTER COUNTS! program reached 11,042 youth, ages 5-18, through its 13 delivery modes. Through these efforts each child received a minimum of six hours of CHARACTER COUNTS! programming. In addition, Virginia 4-H also participated in the 2015 Report Card of Ethics of American Youth survey. The survey was distributed at the 2015 State 4-

H Congress and a total of 234 responses were received. Respondents were between the ages of 13-19 and the majority, 71%, were female. Results from this survey indicate that the respondents are ethical and place high value on being ethical. When asked, in your personal opinion, how important to you is each of the following? 91% rated having a good moral character as either essential (69%) or very important (22%), 85% stated that being thought of as ethical and honorable was essential (57%) or very important (28%), 92% stated that helping others was essential (59%) or very important (33%), 93% rated having trusting personal relationships as essential (72%) or very important (21%), and 100% strongly agreed or agreed that it was important for them to be a person with good character.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #13

1. Outcome Measures

4-H Adult Leaders - Increase the percent of adult 4-H volunteers participating in leadership and volunteer development who indicate increased knowledge and skill development in implementing 4-H programming.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	9908

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Volunteers are a large part of 4-H program. They are often the ones conducting programs, leading clubs, and organizing events. It is essential that 4-H volunteers have a clear understanding of 4-H, the mission of 4-H, and the proper policies and procedures that need to be adhered to. In recent years 4-H has experienced some significant changes in policy and administration. Craig County 4-H has added several new volunteers and others have increased their involvement. These changes necessitated a formal volunteer training. A baseline needed to be established to ensure that all volunteers (both old and new) had received and were receiving the same information.

What has been done

Two volunteer trainings were scheduled and conducted at the beginning of the year and two additional trainings were offered as new volunteers joined the organization. Volunteer training consisted of lecture and hands-on activities. Topics covered included the organization of 4-H, 4-H symbols, definition of a 4-H member and the necessary forms, essential elements, experiential learning model, targeting life skills, developmental characteristics of youth, delivery modes, policies and procedures (risk management, use of clover, confidentiality, etc.), the Virginia Association of Adult 4-H Volunteer Leaders, and continuing support and education. Volunteers were also provided with a folder containing all the information covered in the volunteer training plus additional information and resources. This material was referenced during the training to make volunteers familiar with where to locate information.

Results

A post-training survey was conducted to assess participant perception of the value and helpfulness of the training. As a result of the volunteer training, participants reported strongly agreeing with these statements:

91 percent increased their knowledge of risk management as it pertains to 4-H

73 percent increased their knowledge of the goals of 4-H and the methods used to achieve those goals

73 percent gained knowledge that would help them be a better volunteer

64 percent increased their knowledge of the symbols of 4-H

64 percent felt that volunteer training was worth their time

All of the remaining responses were that participants agreed with the statements with one exception. Nine percent responded that they disagreed with the statement that they increased their knowledge of the symbols of 4-H as a result of the volunteer training. Volunteers expressed appreciation for the training and the resources provided.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Transportation and facilities)

Brief Explanation

Appropriation changes: We have had quite a bit of turnover with 4-H Agents. Fortunately, we have been able to hire new replacements but are still in the process of training them.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

In 2015, the Virginia 4-H CHARACTER COUNTS! program reached 11,042 youth, ages 5-18, through its 13 delivery modes. Through these efforts each child received a minimum of six hours of CHARACTER COUNTS! programming. In addition, Virginia 4-H also participated in the 2015 Report Card of Ethics of American Youth survey. The survey was distributed at the 2015 State 4-H Congress and a total of 234 responses were received. Respondents were between the ages of 13-19 and the majority, 71%, were female. Results from this survey indicate that the respondents are ethical and place high value on being ethical. When asked, in your personal opinion, how important to you is each of the following? 91% rated having a good moral character as either essential (69%) or very important (22%), 85% stated that being thought of as ethical and honorable was essential (57%) or very important (28%), 92% stated that helping others was essential (59%) or very important (33%), 93% rated having trusting personal relationships as essential (72%) or very important (21%), and 100% strongly agreed or agreed that it was important for them to be a person with good character.

Key Items of Evaluation

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
65954	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
5	Number of new crop varieties, animal breeds, and genotypes with climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
1673	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)	
304	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
1	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
11	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
5340	Tons of feedstocks delivered.