2016 Virginia State University and Virginia Polytechnic Inst. & State University Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 07/17/2017

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 2018 we will asking every Unit office to complete a local situation analysis. Unit profiles will be created based on data gathered from a variety of sources such as US and Agriculture census data. Methods to collect community input will include issue forums, focus groups, key informant interviews, and community surveys. Unit situation analyses will 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 latest VCE Strategic Plan. Program Teams that are aligned with Strategic Plan objectives made up of agents, specialists, and others are meeting on a regular basis. These eleven Program Teams coordinate state level programming, including situation analysis, program planning, program development, evaluation, and reporting for the Strategic Plan objectives aligned with it.

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: For 2016, all College of Agriculture and Life Sciences and VSU Extension and research faculty reported through a new University-based activity reporting system. 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. 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: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	342.6	30.5	258.4	15.5
Actual	363.4	23.2	317.4	14.0

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 complementary 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 review and 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 provides critique, suggestions to the project leader, as needed for modifying the proposal, and makes a proposal recommendation, based on four options: 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 that 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 that 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 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 though 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 that 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 2016 all unit offices of VCE their situation analysis that was conducted in the Fall of 2015.
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
7440437	2465602	5237222	2892706

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	9548224	2682430	3939903	2715644
Actual Matching	12350174	2682430	10737689	2715644
Actual All Other	26749475	685348	57784645	1180218
Total Actual Expended	48647873	6050208	72462237	6611506

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

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%	10%
111	Conservation and Efficient Use of Water	8%	0%	0%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	1%	0%	10%	10%
202	Plant Genetic Resources	3%	0%	10%	15%
204	Plant Product Quality and Utility (Preharvest)	10%	0%	0%	0%
205	Plant Management Systems	16%	20%	10%	15%
206	Basic Plant Biology	0%	0%	5%	0%
211	Insects, Mites, and Other Arthropods Affecting Plants	5%	0%	5%	0%
212	Pathogens 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%	10%
302	Nutrient Utilization in Animals	3%	0%	5%	10%
307	Animal Management Systems	7%	10%	5%	15%
311	Animal Diseases	5%	10%	2%	10%
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	1%	0%	10%	0%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	120.9	15.0	195.1	9.5
Actual Paid	124.8	15.0	162.8	8.0
Actual Volunteer	4082.0	71.0	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
3056619	1286031	2020631	1551796
1862 Matching	1890 Matching	1862 Matching	1890 Matching
3953591	1286031	5506964	969873
1862 All Other	1890 All Other	1862 All Other	1890 All Other
8563157	558084	29635610	834457

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, consumers, 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?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	428237	893886	122321	20413

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

Patent Applications Submitted

Year: 2016

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of publications created.

Year	Actual
2016	1706

Output #2

Output Measure

- Number of Extension presentations delivered.

Year	Actual
2016	2520

Output #3

Output Measure

- Number of peer-reviewed journal articles published.

Year	Actual

2016 184

Output #4

Output Measure

- The amount of competitive grant funding received.
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

18	Providing sustainable integrated control strategies for small ruminant dewormer resistance
19	Virginia small farmers marketing together for "berry" big profits
20	Reaching out to Virginia small, limited-resource, and socially disadvantaged producers
21	Virginia small farmers find a market niche with high tunnel grown ginger and turmeric
22	Aquaponics education to small-scale farmers, extension agents and agriculture teachers
23	Improving small farm Good Aquaculture Practices (GAqPs) for fish health

Outcome #1

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

Producers implement practices for animal quality assurance certification.

2. **Associated Institution Types**

- 1862 Extension
- 1862 Research

3a. **Outcome Type:**

Change in Action Outcome Measure

3b. **Quantitative Outcome**

Year	Actual
2016	0

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 2016 there were 827 producers either certified or re-certified. These producers came from 76 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. Results In 2016, a total 17,914 calves were marketed through the VQA program. Producers received a premium of $95 per calf resulting in $1,693,752 of additional income for Virginia beef producers. Since 1997, producers have marketed over 182,000 head of feeder cattle resulting in $9.9 million in value-added income.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Adoption of BMPs results in greater profitability

Not Reporting on this Outcome Measure

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
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Peanut producers in the Virginia-Carolina region have experienced severe losses due to the devastating fungal disease Sclerotinia blight.

What has been done
Since many years of traditional plant breeding has not yielded varieties with resistance to Sclerotinia blight, a research team in plant pathology, collaborating between the Virginia Tech Blacksburg campus and the Virginia Tech Tidewater Agricultural Research and Extension Center, chose a biotechnology approach to provide blight resistant peanut lines for growers.

Results
Researchers introduced an oxalate oxidase gene from barley that conferred excellent resistance to Sclerotinia minor, the causal agent of Sclerotinia blight. In field tests, these transgenic Blight Blocker peanuts demonstrated reduced disease severity and increased yields compared to non-transgenic parent lines.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Direct marketing education improves long term sustainability

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to the 2017 USDA local foods database, there are currently 10 existing food hubs located in Virginia. Food hubs are a potential market outlet accessible to small and beginning farmers in Virginia. Food hubs are emerging as an alternative market outlet for small and mid-sized farm and ranch operations who lack the ability to sell to retail and institutional markets on their own. Due to this inability to produce and deliver high volumes of a given product, these small and mid-sized operations end up missing local food marketing opportunities. The food hub concept offers small farmers assistance in product aggregation, distribution, and marketing, so they can enter confidently into high-volume markets which may increase their on-farm income and long-term farm viability. To take advantage of the emerging food hub market outlet, training is necessary to inform producers and agriculture extension personnel on the market potential of selling to local food hubs. Lack of producer awareness of food hubs, coupled with lack of local county agriculture extension agent working knowledge of training farmers to be market ready for new local food marketing channels such as food hubs is an educational gap that should be addressed to increase on-farm income in Virginia.

What has been done
In response to the lack of producer awareness of potential local food marketing channels, the following activities were conducted:
? 3-county agents supported in local food market outlet development and/or establishment (City of Suffolk, Surry County, Mecklenburg County)
? 20-county agents attended trained in local food market outlet development and/or establishment
? 300 small farmers increased awareness of food hubs as a potential market outlet

Results
? 44 limited resource producers made aware of and participated in new direct markets (such as food hubs), earning a total minimum gross income of $913,400.00
? 1 food hub planned in South Hill, VA
? 1 food hub restructured in Richmond, VA

4. Associated Knowledge Areas

KA Code	Knowledge Area

601 Economics of Agricultural Production and Farm Management

Outcome #6

1. Outcome Measures

Aquaculture producers improve profitability through enhanced management

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia has over 80,000 farm ponds. Many farm pond owners use their ponds for recreational fisheries and some for cage aquaculture. For many of these ponds, water quality parameters are not suited for sustainable recreational fisheries. In fact, many of these farm ponds water quality parameters are below the recommended levels needed for having a productive pond.

What has been done
Pond management workshops were developed with Extension Agents in response to growing issues that farm pond owners were calling about to get answers. These workshops focused on three primary concerns: aquatic weeds, water quality, and management of the fish population. As an integral part of farm pond management workshops with Extension Agents in their county, the program covers the importance of water quality of ponds.
Farm pond owners are educated on the methods that will improve water quality for the fish ponds to be productive and create conditions for proper aquatic ecology to have a good fish population once certain water quality parameters are reached. At every farm pond workshop, pond owners were asked to bring in a water sample of their pond for testing.
All samples were tested on site at the workshops and an overall report given to the participants with individual reports sent a letter with specific actions to take based on their pond water quality.

Results
? 110 pond water samples were tested
? 110 Virginia pond owners received a written report and recommendation on improving the water quality of their pond
? 28 of pond owners receiving recommendation report improved the water quality of their pond
? 28 of pond owners reported higher productivity of the fish population, larger fish and higher

biomass per acre

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

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
2016	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.

What has been done

The regional ?Feed Grains Initiative?, including a multi-state official variety testing program (OVT) was established in 2013. Sorghum hybrid comparison tests were performed from 2010 through 2012 at several locations in VA, NC, and SC. In 2014 new test locations in Maryland were added. Replicated variety trials at multiple locations in VA were conducted at research stations and also in farmer?s fields, for yield and agronomic characteristics such as disease pressure. Identification

of the best adapted grain sorghum hybrids for the Mid-Atlantic region was pursued.

Results

Sorghum production information and research results were included in 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 to 12,000 from only 9,000 in the previous year. We have identified that sorghum is a suitable crop on marginal land where corn usually fails. With a price per bushel of 95% of the corn price, on these impoverished areas sorghum can produce from 40 to 70 bushels per acre with almost no inputs. According to the Extension Economist, Gary Bullen, at the North Carolina State University, on fertile land corn and sorghum could have comparable returns to the farm at bushel prices of $4 and over. At lower prices, however, both crops will have positive returns only at yields around or higher than 150 bushels per acre. Based on OVT testing yield studies, we have determined this production yield is possible to achieve with only certain sorghum hybrids and optimal management practices. At lower yields, when price per bushel is low, farm deficits were estimated for both crops, but they were almost double for corn than for sorghum (http://www.peanut.ncsu.edu/)

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Researchers work to develop a Staphlococcus 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
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Dairy producers strive to manage mammary gland infections in lactating dairy cattle. The costs associated with such infections include veterinary costs, reduced income as milk from antibiotic-treated cows cannot be sold, and increased management costs associated with handling the

treated animal. New treatments that reduce the risk of mastitis are needed.

What has been done

Meta-analysis was used to explain challenges associated with different methods of evaluating teat dip efficacy at preventing mastitis. This is the first known attempt to understand how experimental method influences results of animal health investigations. The study also identified differential efficacy of treatment options at preventing mastitis caused by unique pathogenic agents. Methods of meta-analysis were compared to determine appropriate approaches for prediction of treatment effectiveness.

Results

Traditional meta-analysis methods are robust strategies to coping with several common data problems but orthogonal regression can help to account for errors in explanatory variables that are not commonly accounted for in meta-analyses. A review paper was published that highlights the types of data that should be included in publications to ensure they can be incorporated into meta-analyses. This publication highlighted the challenges with completeness and accuracy of literature data and the implications of incomplete or inaccurate data when used in meta-analysis. This guidance will be helpful to dairy scientists as they plan experiments related to prediction of mastitis and efficacy of therapeutic treatments.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Edamame research explores suitability of new cash crop for Southside Virginia

Not Reporting on this Outcome Measure

Outcome #10

1. Outcome Measures

Researchers explore native bee potential for orchard pollination

Not Reporting on this Outcome Measure

Outcome #11

1. Outcome Measures

Applying simple artificial insemination in sheep on small farms

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The American Sheep Industry Association is aggressively promoting the expansion of the national sheep flock to take advantage of an expanding market for lamb. Sustainable, forage-based sheep production requires the use of breeds that utilize pastures efficiently, are hardy, are highly tolerant to internal parasites, and are able to cope with climate change. Hair sheep are uniquely suited to limited resource farmers, as well and to the Southeastern production environment. Effective technologies are needed to move hair sheep germplasm readily between farms to allow the use of superior genetic resources and facilitate genetic improvement. Movement of breeding animals between farms is becoming increasingly difficult due to the high cost of live animal transport, health certificate requirements, and concerns with biosecurity and animal welfare. Artificial insemination (AI) in sheep is not widely adopted because of the anatomical constraints presented by the ewe?s cervix, as well as the limitations in cryopreserving ram semen. Acceptable pregnancy rates with frozen-thawed sheep semen can only be achieved through the use of intrauterine laparoscopic AI, making this procedure cost prohibitive for small farms. An effective, low-input insemination system is needed for sheep that will make this procedure available to small farms.

What has been done
The VSU Reproductive Physiology Lab has developed a technique of vaginal AI in sheep using liquid semen. Researchers have tested the "shot-in-the-dark" method extensively under research conditions, addressing all aspects of the artificial insemination procedure, including semen collection, processing and storage, and estrus synchronization, along with the insemination process itself. In working on the various components of the AI system, scientists tried to keep in mind that each part of the procedure would need to be applied at the farm level with limited investment. As a result, we developed a simple UHT milk and egg yolk semen extender using ingredients available at the local supermarket, synchronization is based on a species-approved progesterone implant, and just a simple AI gun is required for insemination.

Five trials were conducted on Virginia hair sheep farms in October of 2014 and 2015 during peak seasonal breeding. To synchronize estrus, producers inserted CIDRs (controlled internal drug release devices) into ewes for 10 days, then removed them 48-hrs before AI. The morning of insemination, semen from hair sheep rams was collected at VSU using an artificial vagina, then extended to 250 million sperm/ml and packaged into 0.5 ml color-coded straws. Semen was placed in coolers with blue ice for transport to cooperating farms. Between 5 and 20 ewes were inseminated at each farm using semen from multiple rams and a standard insemination gun for AI without the use of a speculum. At the initial insemination, cooperating farmers were trained in the technique and conducted either one or two additional inseminations later on their own at 6 hours (at all farms) and 12 hours (at two of the farms). Pregnancy was determined via transrectal ultrasound 22 days after AI. Pregnancy rates ranging from 40% to 67% were achieved on the various farms.

Results

Use of liquid semen vaginal AI may be a practical and effective tool for commercial use in the hair sheep industry. During seven farm visits at four different farms, researchers attained pregnancy rates ranging from 40% to 67% when using this combination of AI and semen preservation.

To achieve satisfactory pregnancy rates, the technique needs to be applied during the breeding season, using mature ewes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

Outcome #12

1. Outcome Measures

Commonwealth Pollinator Protection Program

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The presidential memorandum of June 2014, Creating a Federal Strategy to ?Promote the Health of Honey Bees and other Pollinators,? added momentum to the growing national attention for the plight of pollinators, both native and introduced. A need existed for the education of pesticide applicators, VCE personnel, and the general public regarding the vital role native pollinators play in Virginia ecosystems.

What has been done

As part of the VCE action plan in Pesticide Safety Education, priorities, presentations, demonstration sites, and publications focused on native bee identification, ecology, and rearing. These were generated and delivered to a variety of audiences throughout Virginia in 2016. Audiences included VCE associations like Virginia Master Gardeners, Master Naturalists, and agents, as well as Native Plant Society groups, school children, and the general public (in outreach activities like open air Earth Day celebrations). In addition, certified pesticide applicators were trained regarding the risks to pollinators posed by improper pesticide applications. Finally, four faculty and VCE staff participated in the yearlong pollinator protection plan focus groups and advisory committee to develop a plan to mitigate the impact of pesticides on managed pollinators. Two demonstration solitary native bee nests were set up at the Hahn Horticulture Garden and developed additional information via a publication entitled ?Solitary Bee Houses at the Hahn Garden.? Two versions of a fact sheet, ?Solitary Bee Houses as Teaching Tools? were produced to explain how solitary bees can be used by Extension agents and teachers to teach bee biology, ecology, host/parasite interactions, and general bee appreciation to diverse audiences.

Results

In all, 24 presentations were given, directly reaching 1,516 people. Over 10,000 people were reached with the pollinator protection message through a television segment on regional news station WSLS ?Daytime Blue Ridge?, an article on protecting pollinators during mosquito control around homes printed in Roanoke Times in June, and via an information booth set up for the 8 hours of the HokieBugFest (7,700 people in attendance). Two demonstration solitary native bee nests enabled visitors to witness the gentle nature of pollinators, and receive additional information via a publication. Two versions of a fact sheet, ?Solitary Bee Houses as Teaching Tools? were produced to explain how solitary bees can be used by Extension agents and teachers to teach bee biology, ecology, host/parasite interactions, and general bee appreciation to diverse audiences.

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

Certified Pesticide applicators through Pesticide Safety Education Programs

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	181

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
U.S. Department of Agriculture (USDA) and the US Environmental Protection Agency (EPA) mandate the safe use of pesticides by commercial, private, and public applicators. USDA and EPA ask Cooperative Extension nationwide to address this mandate.

What has been done
The Virginia Pesticide Safety Education Program provides workshops, certification courses, training manuals, electronic media, and web-based education for pesticide applicators. In addition, the program provides train-the trainer workshops for pesticide applicator trainers. VCE Pesticide Safety Education trains commercial and private pesticide applicators and certifies according to state and federal requirements. Certrified pest managers can legally purchase and apply pesticides on farms, pest management businesses, and public IPM programs throughout Virginia. Agent trainers hosted 181 trainings and they were prepared by attending the 24th annual Virginia Pesticide Safety Educators Workshop (115 Extension agents, specialists, and VDACS pesticide investigators enrolled). The workshop was held in conjunction with the American Association of Pesticide Safety Educators national workshop. VCE hosted 14 online courses to prepare applicators for certification. Multistate Extension Collaborators: The program works with nearby states, federal agencies, and the American Association of Pesticide Safety Educators to solve critical issues relating to pesticide safety education and compliance assistance. Multistate Extension Involvement/Integrated Research and Extension Involvement: The activities address critical needs of stakeholders by helping them fulfill the regulatory compliance requirements for certification and training under federal and state pesticide control laws.

Results
Over 30,000 agricultural producers and pest managers maintain certification in 27 pesticide applicator categories by using our manuals and educational programs. VCE recertified 2,584

private applicators in 2016. Pesticide safety education information was shared with 29,506 users (81,075 pageviews, 38,267 sessions). Because of the program, risks to public health and the environment were minimized while maintaining crop protection and effective pest control.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #14

1. Outcome Measures

Farms develop agritourism enterprises

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	90

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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, based on the 2007 USDA farm census from agritourism and farm-related recreation in Virginia increased from $2.7 million in 2002 to $12.9 million in 2007. This same study concludes that 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.

What has been done

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, based on the 2007 USDA farm census from agritourism and farm-related recreation in Virginia increased from $2.7 million in 2002 to $12.9 million in 2007. This same study concludes that 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.

Results

Over 90% of the farms responding to evaluation requests reported an increase their knowledge and/or skills and indicate that their agritourism operations will expand the events and improve the marketing of the unique experiences offered by their farms. Agritourism entrepreneurs are networked through the listserv and are provided access to resources and support for building their businesses.

One Virginia farm received a $5,000 state grant for a marketing and business plan.

Virginia Department of Commerce and Trade and the Virginia Department of Agriculture and Consumer Services recognize agritourism as an economic development driver.

4. Associated Knowledge Areas

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

Outcome #15

1. Outcome Measures

Beginning farmers implement whole farm planning goals

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

As a state-wide coalition based Extension program, the Virginia Beginning Farmer and Rancher Coalition Program works to improve opportunities for beginning farmers and ranchers to establish and sustain viable agricultural operations thorough whole farm planning programs. Currently, five place-based whole farm planning training opportunities are held across Virginia by Coalition members. These trainings provide farmers with a range of classroom-based workshops, farm tours, field instruction, and networking opportunities using our Whole Farm Planning curriculum. The five areas of whole farm planning included in the curriculum are: Introduction to Whole Farm Planning, Marketing, Business Management, Land Tenure, and Sustainable Farming Practices. While information is gathered at the beginning and/or end of each of the training opportunities to judge importance and relevance of the trainings, no information was available on the continued successes or limitations faced by farmers who participated in these programs.

What has been done

Beginning in March 2016, the Virginia Beginning Farmer and Rancher Coalition began collecting evaluative information from past participants of the VBFRC whole farm planning programs, using both a Qualtrics survey and interview methods. The VBFRC aimed to understand how the attitudes and farming practices of participants in the whole farm planning programs between 2012-2015 have changed since completing their programs.

Results

A survey was distributed to approximately 224 individuals, with 38 responses being received. A second survey was sent to 130 individuals and received 33 responses. Results include data collected by these surveys, as well as interviews with five participants of the whole farm planning programs. A majority of respondents are currently farming or planning on farming (n=35). Common challenges faced by respondents include: access to affordable land and financial resources, access to dependable labor, and productivity. Common goals listed by respondents include: expanding farm and improving practices, expanding markets and increasing sales, changing or improving accounting system, developing a formal business plan, purchasing or renting additional land, and including more sustainable farming practices (e.g. using cover crops, crop rotation).

4. Associated Knowledge Areas

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

Outcome #16

1. Outcome Measures

Farm operators use Market Maker to enhance direct marketing

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Market Maker portal is the largest and most in-depth national database for the agricultural industry. The portal provides a simple search tool to connect buyers, farmers/ranchers, fisheries, farmers markets, processors/packers, wineries, restaurants and more. With the generous support of our partners and stakeholders, VA Market Maker is available at NO COST to Virginia producers, processors and consumers.

What has been done
Launched Virginia MarketMaker portal in June 2015. Purchased mobile Virginia MarketMaker kiosk that is available upon request statewide. Published fact sheet and YouTube video on how-to sign up an agribusiness on the MarketMaker portal. Published six blog posts designed to demonstrate use and value of portal to VA agribusiness. Presented the VA MarketMaker kiosk at 20+ meetings across Virginia. Invited by Stephanie Agee, VDACS Marketing Director, to present ?Diversifying Markets to Mitigate Risk Using Technology to Engage & Connect with Suppliers and Customers? to 30+ VDACS marketing specialists in June 2016.

Results
200+ farms and agribusinesses completed unique registrations within first six months.

4. Associated Knowledge Areas

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

Outcome #17

1. Outcome Measures

Developing an aquaculture and freshwater shrimp industry in Virginia

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The National Restaurant Association gives "Local grown livestock and produce? top rank in the 2016 culinary food trends. Driven by the local foods movement, Virginia consumers are hungry for ?local foods.? With diverse food palates, consumers seek out unique locally produced products. Shrimp is highly desired by U.S. consumers and is the most popular of all seafood consumed in U. S. Shrimp comprises over 25 percent of the nation's annual per capita seafood consumption. Most of the shrimp consumed in the U.S. is imported. Introducing shrimp production techniques to small aquaculture farmers in Virginia may increase on-farm income due to the high retail price of shrimp.

What has been done
Virginia Cooperative Extension has been involved with each step in the production process. Interest by prospective producers exists throughout the commonwealth from Tidewater to Western Virginia and from Northern Virginia to the tobacco growing southern counties. The Extension Office serves as a source of production information and communication between the Virginia based juvenile shrimp suppliers and farmers. Demonstrations of best management practices for shrimp producers are shown at VSU?s Randolph Farm. Assistance is provided by accompanying new producers with their juvenile shrimp transportation and stocking.

Results
? 20 producers have adopted freshwater shrimp production
? 5 local market outlets established in conjunction with participating farmers includes:
- Direct sales to consumers ($10.00 per pound) estimated total sales of $20,000.00
- Value added Juvenile shrimp stock sales earned local nurseries over $10,000.00
- Wholesale to Virginia Aquaculture Marketing Network
- Value added sales using shrimp boil events
- Value added frozen processed product via internet sales

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
604	Marketing and Distribution Practices

Outcome #18

1. Outcome Measures

Providing sustainable integrated control strategies for small ruminant dewormer resistance

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Infection with internal parasites, especially the barber pole worm (Haemonchus contortus), is the number one health problem affecting sheep and goats. Traditionally, producers relied on chemical treatments (dewormers) to control infections. However, due to misuse and over-use, internal parasites have developed resistance to multiple classes of available dewormers. There is now an urgent need for producers to adapt sustainable integrated control strategies for parasite control to reduce reliance on chemical dewormers and prolong their efficacy on farms. In order to do this, producers need training and on-farm dewormer resistance testing to determine the status of resistance on their farm.

What has been done

To address this issue, the VSU CE small ruminant program has conducted workshops on internal parasite management, offered FAMACHA© certification training to extension agents and producers, conducted fecal egg counting training (to determine dewormer resistance, make selection choices and determine pasture infestation), assisted producers in determining the status of dewormer resistance on their farm, and conducted direct technical assistance for ANR extension agents in order to increase their awareness, knowledge, and skills in guiding small ruminant producers in Virginia.

Results

?Extension programs conducted increased knowledge of 150 producers and agents on small ruminant internal parasite management
? 38 small ruminant producers received FAMACHA© certification
? 32 producers developed skills in conducting fecal egg counts
? One producer set up a fecal egg counting lab on farm to make selection choices based on counts to develop a more resistant herd
? Seven producers made of aware of dewormer resistance status on their farm and were provided with individualized treatment recommendations for controlling parasites in their flock

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
311	Animal Diseases

Outcome #19

1. Outcome Measures

Virginia small farmers marketing together for "berry" big profits

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Small growers in Virginia are searching for alternative crops with market potential. In the United States, consumers are more aware of the health benefits of eating berries. Berries contain antioxidants that research has proven to reduce cancer risk, lower cholesterol, and improve heart health. Increased demand for locally produced berries is boosting grower interest in growing berry crops in Virginia. Extension field and high tunnel demonstrations have determined berry crops such as blackberry, blueberry, raspberry, and strawberry can be successfully grown in Virginia by small, limited resource growers.

What has been done
The Small Fruits and Vegetable Program at VSU-COA conducted research in identifying raspberry, blackberry and blueberry varieties with a higher yield and better fruit quality. Production

management techniques were developed. Through grant funding, a total of $720,000.00 has been obtained. In collaboration with Virginia Cooperative Extension Agents and Extension Specialists the production and marketing of berry crops is being promoted among small Virginia growers as a potentially profitable alternative enterprise.

Results
? 50 participating small farmers are growing and marketing locally produced berry crops in Virginia
? One local berry food hub established to market Virginia grown berries
? Annual sales of Virginia grown berries through direct and wholesale markets is $500,000

4. Associated Knowledge Areas

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

Outcome #20

1. Outcome Measures

Reaching out to Virginia small, limited-resource, and socially disadvantaged producers

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Small farmers in Virginia have been faced by several barriers that limit their ability to successfully operate a profitable farm business. Such barriers are, but not limited to,: 1) Lack of knowledge of USDA programs and services, 2) limited access to credit and capital, 3) lack of skills in farm business and financial planning, 4) lack of knowledge of improved production practices and 5) limited access to existing and viable markets.

What has been done
In order to address these issues, VSU-SFOP collaborated with USDA agencies, Virginia Cooperative Extension, other service providers, and community leaders to plan and conduct the

following activities:
? Over 100 educational outreach events informing producers about the following topics:
- USDA programs and services
- Farm business planning and financial management workshops
- Improved production systems for high value and profitable crops and livestock
- Hands-on demonstrations with appropriate small farm tools and equipment
- Marketing strategies to enhance their farm profits

Results
In June 2016, VSU-SFOP Conducted a progress evaluation survey of 1000 small farmers based on the above activities conducted. The results were: 79% of the respondents indicated that VSU-Small Farm Program has helped them to gain a better understanding of operating and maintaining a small farm. 62% of them indicated that the knowledge gained from VSU hands-on demonstrations, field days, workshops and other activities has improved profits in the farm business. 42% of them reported an increase in farm incomes by at least 10% from the previous three years. As a result of attending VSU SFOP trainings, 420 small farmers in Virginia reported a 10% increase in farm income from the previous three years.

4. Associated Knowledge Areas

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

Outcome #21

1. Outcome Measures

Virginia small farmers find a market niche with high tunnel grown ginger and turmeric

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Ginger and turmeric roots are culinary and medicinal ingredients treasured by many ethnic cultures worldwide. Due to the anti-inflammatory properties of both ginger and turmeric, as well as their use as highly valued aromatic spices, market demand is growing for locally grown product. Market studies determined fresh baby ginger grown locally can sell up to four times as much as retail mature ginger sold in store. Local fresh baby ginger and turmeric sales in Virginia range from $5.99 to $16.00 per pound. Virginia small farmers may be able to take advantage of year-round consumer demand by growing ginger and turmeric under high tunnels.

What has been done

The Virginia State University College of Agriculture Small Fruits and Vegetable Program provides training and consultation to small farmers who are interested in growing and marketing ginger and turmeric. At VSU Randolph Farm and on participating grower operations, we conduct educational programs to teach how to grow and market locally produced ginger and turmeric grown under high tunnel culture.

Results

? 110 small farmers educated on growing high tunnel ginger and turmeric
? 30 participating small farmers are commercially growing ginger and turmeric in Virginia
? Participating farmer reported sales of locally grown ginger and turmeric exceeded $30,000.00

4. Associated Knowledge Areas

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

Outcome #22

1. Outcome Measures

Aquaponics education to small-scale farmers, extension agents and agriculture teachers

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Aquaponics is the production of fish in a recirculating water system in conjunction with plant production. Aquaponic systems use farmed fish waste to supply nutrients for plants grown hydroponically. Small farmers and hobbyists seek reliable information about aquaponics to begin and maintain their aquaponics operations. Limited information and resources are available for Extension Agents and Agriculture Teachers. Training is needed for individuals interested in starting an aquaponics business enterprise

What has been done

To address the educational needs of individuals interested in starting an aquaponics operation, the VSU Aquaponics Team developed training and assistance to facilitate quick utilization of aquaponics technology.

Training and assistance conducted included tours of the existing aquaponics operation at VSU Randolph Farm, presentations, planning meetings, seminars, displays, hands-on workshops and on-site production assistance to Virginia aquaponics operations.

Results

- 200 growers and hobbyists participated in hands-on training in construction, set-up and operation of a typical aquaponics system
- 20 individual planning meetings were provided to agriculture educators to help with their specific systems
- 20 aquaponic systems were either newly constructed or improved
- 10 extension agents were trained in aquaponics set-up and management
- 3 schools adopted aquaponics best management practices
- 60 agriculture and horticulture high school students learned to grow fish, lettuce and tomatoes
- 10 culinary students learned how to prepare and serve aquaponic grown produce and fish

4. Associated Knowledge Areas

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

Outcome #23

1. Outcome Measures

Improving small farm Good Aquaculture Practices (GAqPs) for fish health

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Seeing fish die in a pond or cage or tank on your farm is a very scary sight and in some case a real nightmare. These fish are the profits for the farm. A fish farmer never wants to see this happen on their farm. Keeping fish healthy and alive is a challenge that fish farmers face every day. Many farmers don?t have any written plans to deal with fish dying or other fish health issues. The lack of Good Aquaculture Practices (GAqPs) for fish health on a fish farm increases the risk of potential disease outbreaks and poor water quality. The farmer needs to know what GAqPs (best management practices) are required to prevent diseases and poor water quality that would result in a massive die-off of fish on fish farms.

What has been done
A series of workshops were developed to provide training on Good Aquaculture practices known as GAqPs. Various GAqPs were developed for various subject areas ? pond culture, aquaponics and etc. ? a series of topics in aquaculture were incorporated into the workshops including Fish Health which was considered a critical element in the GAqP training of the participants. Farmers, potential farmers, ANR Agents, government personnel and NGO?s were invited to these workshops on good aquaculture practices. Workshops were hosted at Virginia Beach, Northern Virginia, Blackstone Virginia, FDA Maryland and North Carolina.

Results
- Over 150+ participants (Farmers, Government officials, and Extension Agents) were trained in Good Aquaculture Practice (GAqPs)
- Improved biosecurity at Virginia aquaculture facilities resulted in prevention of disease outbreak
- Reduced disease outbreak reduced the use of chemicals and antibiotics in participating GAqP operations
- Improved consumer food safety due to reduction of chemical and antibiotic residue levels in aquaculture raised fish
- Increased economic value for producers who produce chemical and antibiotic residue free fish available to local customers

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
307	Animal Management Systems
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

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: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	3.2	1.0	8.8	1.0
Actual Paid	3.3	0.0	6.9	1.0
Actual Volunteer	16.0	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**
128596	0	85010	193975
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
166332	0	231685	387949
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
360262	0	1246806	173354

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?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1234	1563	137	0

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	10	10	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
2016	45

Output #2

Output Measure

- Number offact sheets, publications, newsletters, and other print resources

Year	Actual
2016	86

Output #3

Output Measure

- Number of peer reviewed journal articles.

Year	Actual
2016	91

Output #4

Output Measure

- The amount of competitive grant funding received.
  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	Increase farm profitability due to more energy efficient practices
2	Increase adoption of sustainable energy conversion technologies
3	Increase understanding of raw material conversion and modern business management practices.
4	Researchers develop novel germplasm with higher biomass potentials, suitable for large scale and sustainable biomass production in Virginia
5	Develop microbial systems for the production of bio-fuel, more effective therapeutics and vaccines for TB, and for facilitating better nutrient utilization in ruminants.
6	Energy Efficiency Education Program helps low-income renters save money and energy

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
2016	66

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The level of use and cost of fuel, oil, and electricity are continually increasing for Virginia farms. 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.

The USDA Natural Resources Conservation Service reported 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.

What has been done
VCE and its partners launched the 2010-2012 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 utilization of appropriate technology; provides research guidance on technology and farm production; links

farmers with the best practices, knowledge experts, and funding opportunities; collaborates with federal and state agencies and energy companies to support Virginia agricultural entrepreneurs to implement energy upgrades; funds the audit expense and cost share for project retrofits; and provides technical assistance to guide the farmer with interpreting the findings.

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.

Results

VCE provided access to and funding for energy audits and renewable feasibility studies for 66 agricultural operations in Southside and Southwest Virginia.

Between 2014 and 2016, 71 farms were accepted into the energy program, 5 farms withdrew, 64 of the 66 remaining farms completed an energy audit with 2 farms delaying their audits, 31 farms have used approximately $214,000 in grant funding along with over $610,000 in individual funds to implement energy retrofits, and 35 farms have funds remaining in their energy accounts for additional improvements.

The 64 completed farm energy audits identified potential annual energy savings of 873,968 kWh in electricity and 429,847 gallons of propane with efficiency improvements resulting in a projected 3,151 MTCO2 greenhouse gas emissions reductions and an annual energy-cost savings of $850,734. Approximately 46% of the energy conservation measures had a payback period of less than 5 years.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Increase adoption of sustainable energy conversion technologies

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Develop 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
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The understanding of the ecology and biochemical interactions of anaerobic microorganisms (anaerobes) that degrade biopolymers in cows foregut (rumen), human large intestine, anaerobic waste digesters, natural gas producing bioreactors (operating with agricultural wastes), and in lake, rive, ocean sediments coordinate their activities limits our abilities to provide solutions for big problems. A full understanding of the underlying mechanism would allow for the development of (i) nutrient management strategies and therapeutics for alleviating obesity and type 2 diabetes in human, (ii) therapeutics from infectious diseases that are polymicrobial in nature, (iii) strategies for better forage utilization in beef and dairy cattle, (iv) commercially viable processes for the production of biofuel from renewable resources, (v) optimal methods for waste treatment, and (vi) a better understanding of the process of greenhouse gas production in nature.

What has been done
Basic and applied research strategies have been utilized to identify the interactions of enzymes with oxidative pathways. Genomic research has been used.

Results
The results of our research suggest that anaerobes use unknown types of redox sensors, flavin

coenzymes and a thioredoxin-based system to optimize their interactions with each other. Virginia Tech researchers have evidence that indicates that a family of enzymes that utilize a deazaflavin cofactor (F420) helps M. tuberculosis to build a complex cell wall that helps it to avoid attack from human immune system. The results of genomic analysis of industrial strains have shown that genome based retooling could be used to develop better processes for the production of vaccines against bacterial diseases. The deazaflavin cofactor-dependent cell wall synthesis enzymes could now be targeted for developing drugs for TB. Manipulation of the redox control system described above would help to achieve applied goals for biofuels and animal and human health. Genome-enabled approaches must become routine in the development vaccine production processes.

4. Associated Knowledge Areas

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

Outcome #6

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 Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	655

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 FCS agent Jennifer Abel saying 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 Extension could help. In Arlington and Alexandria's 2013 situation analysis the environment emerged as the number one priority issue.

What has been done
VCE 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, 2015, and 2016 they received consecutive grants of $18,000 each. In 2016 154 trained volunteers (36 of whom were trained in 2016) completed retrofits in 152 apartments. To date Energy Masters volunteers have performed energy- and water-saving retrofits in 655 Arlington and Alexandria apartments. Volunteers have installed 781 faucet aerators, 333 low-flow showerheads, 284 toilet tummies, 8,935 outlet gaskets, 338 power strips, 3,912 compact fluorescent light bulbs, and 522 LEDs.

Results

Initial data showed that 655 properties have saved an estimated 276,468 kilowatt hours of energy, 8,598,774 gallons of water, and $126,944 in utility costs over the first five years of the program. In 2016, the program received two awards: ?Best Affordable Housing Energy Conservation Effort? from the Virginia Governor's Housing Conference and ?Virginia Energy Efficiency Leadership Awards: 3rd place? in the Low-Income category. 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. The grant runs through June 30, 2017, and two of the winter 2016 workdays were in Alexandria, along with two more in 2017.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
402	Engineering Systems and Equipment

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 # 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: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	35.6	1.0	0.0	0.0
Actual Paid	36.8	0.7	0.0	0.0
Actual Volunteer	604.0	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**
422882	112390	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
546978	112390	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1184709	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

To address the Community Viability planned program, we will:

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

2. Brief description of the target audience

1. Individuals
2. Families
3. Owners and managers of farms and small businesses
4. Local, state, and federal personnel and policy makers
5. Community leaders and organizations
6. Private sector service suppliers

3. How was eXtension used?

eXtension was used to provide professional development via webinars, access information and materials for distributing to program participants, and for gaining expert information for inclusion in presentations delivered by VCE faculty in face to face and online trainings.

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	25452	24546	2369	73

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	3	7	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of education programs planned in public policy education
  Not reporting on this Output for this Annual Report

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
2016	23

Output #3

Output Measure

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

Year	Actual

2016	88

Output #4

Output Measure

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

Year	Actual
2016	116

Output #5

Output Measure

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

Output #6

Output Measure

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

Year	Actual
2016	23

Output #7

Output Measure

- Number of civic engagement events held

Year	Actual
2016	26

Output #8

Output Measure

- Number of programs offered regarding local foods and community food systems

Year	Actual
2016	23

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	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	Economic and Community Planning- Increase in self-reported preparedness among communities receving economic development and community planning education
3	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.
4	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.
5	Community Food Systems: Increase the number of local communities partnering with Virginia Cooperative Extension faculty to strengthen the connection between local agriculture producers and growers with local food-related businesses and purchasing institutions
6	Land Use Education Program
7	Agritourism in Virginia's New Economy

Outcome #1

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
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

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 recognize and build on their shared economic assets, work together to remove the barriers to economic growth, utilize economic data, and build an evidence-based plan; then the probability of creating a vibrant economic region is elevated.

What has been done
SET was developed by the Southern Rural Development Center (SRDC) in collaboration with the USDA Rural Development. In 2014, a curriculum revision team was organized with Virginia as one of its participant. This SET V National Curriculum Team received a 2015 NIFA Partnership Award honoring those whose exemplary work has helped the agency fulfill ts mission of investing in and advancing agricultural research, education, and extension' https://nifa.usda.gov/press-release/nifa-recognizes-outstanding-contributions-annual-day-appreciation .

The work started in January 2015 when Virginia Extension in partnership with USDA Rural Development â??Virginia applied to be part of SET V. Virginia was one of 13 states accepted as part of the 2015 Stronger Economies Together (SET) V initiative http://srdc.msstate.edu/set/ Virginia received 7 regional applications representing 35 counties, 10 cities, and more than 8 towns â?? more than any other state. The team conducted field visits to each region, completed training, and selected 2 Virginia regions in August for the 2015-16 SET initiative and added a third

region in November.

A total of 24 three/four hour planning discussions were held in the 3 SET regions. The 2015-2016 SET regions included: 1) Eastern Shore, consisting of Accomack and Northampton counties and Tangier Island; 2) Mount Rogers Planning District, made up of Bland, Carroll, Grayson, Smyth, Washington, and Wythe counties and the cities of Bristol and Galax; and 3) Northern Shenandoah Valley region including Clarke, Frederick, Page, Shenandoah and Warren counties and the city of Winchester.

Virginia was also granted the opportunity to pilot an abbreviated SET training called â??Leaders in Economic Alliance Development' (LEAD). The New River Valley region was selected as the LEAD region and launched the discussions in December 2015.

Within the context of VCE, all of these leadership programs address the focus area of "Cultivating Community resiliency and Capacity," and they are part of the strategy to achieve Goal 2: Develop and deliver educational programming to improve capacity among community members to engage in community planning, decision-making, and community leadership.

Results
Using the SET training materials, each of the three SET regions and the LEAD region developed a multi-county regional economic development plan built on local regional strengths and assets.

Eastern Shore and Northern Shenandoah Valley SET plans completed the peer-review process and were awarded a $5,000 seed grant for their â??evidenced-based' plans. Mount Rogers is submitting its revised plan in 2017.

The LEAD New River region's plan was successfully implemented in August 2016. Over 450 volunteers representing student groups, businesses, river advocacy groups, and the general public attended the Renew the New event and removed an estimated 2 tons of garbage and hundreds of tires in the first regional river clean-up event in the New River Valley. The New River Valley Regional Commission accepted two awards for this regional project: 1) the National Association of Development Organizations (NACO) Innovation Award and 2) the Virginia Soil and Water Conservation Society's Merit Award for 2016.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #3

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Community leaders appear to struggle with understanding the best options for community engagement, facilitation, conflict resolution, meeting management, and strategic planning/implementation. These skill sets are essential for community leaders to support community progress. This need has been validated by the increased number of request received for assistance in decision-making and strategic planning.

What has been done
Virginia Cooperative Extension equipped its agents and specialists with tools for planning and delivering facilitation services using the Strengthening Your Facilitation Skills curriculum. In addition, specialists are prepared to design a process for planning and decision-making and deliver facilitation support to agencies, organizations, and community groups in Virginia cities and counties.

A total of six, 15-hour, interactive facilitation workshops were delivered during 2016 in Charlottesville (17), Christiansburg (15), Danville (19), Falls Church (18), Harrisonburg (10), and Prince George (16) with 95 individuals completing the facilitation training. In addition, Extension facilitated 24 sessions for the Stronger Economies Together regional economic developing planning process and delivered a workshop on community engagement as part of the 2016 Virginia Chapter of American Planners Association conference.

Many times Extension is asked to have a one-on-one consultation with groups to assist in outlining discussion strategies. However, the majority of requests that flow into our Extension offices are pleas for guidance and the delivery of well-planned, facilitated discussion with a clear plan of work charted for the group.

Agencies requesting services included Amherst County, Virginia Farm Bureau, Danville Life Saving Crew, Eastern Shore Library System, Virginia Farmers Market Association, Patrick Henry Foundation, Soil & Water Districts, The Highland Center, Upper Roanoke River Roundtable, Pittsylvania County, Powhatan Farmers Market Board, Virginia Horse Industry Council, Westmoreland County School System, Gloucester Parks, Recreation, & Tourism, and Virginia Food System Council.

Community planning, decision-making, and facilitation services programming addresses VCE focus area, "Cultivating Community resiliency and Capacity," and provides a strategy to achieve Goal 2: Develop and deliver educational programming to improve capacity among community members to engage in community planning, decision-making, and community leadership.

Results

The facilitation training delivered throughout the Commonwealth resulted in 95 individuals reporting an increase in understanding, knowledge, and confidence in the facilitation process and discussion tools.

Because of the recommendations of Extension agents and Extension's respected reputation, more than 20 organizations/agencies were led through the development and/or implementation of a facilitated decision-making process in 2016 resulting in a strategic discussion plan and/or a well-defined organizational focus and/or a plan of work for each organization.

Blue Ridge, Big Walker, and Scott County Soil & Water Conservation Districts completed their three-year strategic plan. Blue Ridge reported that the Extension facilitation team â??exhibited the highest levels of professionalism and expertise that were needed in order to fulfill the necessary requirements for achieving successful results.' Big Walker was very clear in their evaluation that that the â??quality of the plan itself may be the best they have ever put together' and the process worked extremely well.

Because of the previous facilitated conversations with regional stakeholders on the Duke Energy Coal Ash Release, 354 acres of land along the North Carolina Mayo River have been purchased and placed into conservation for the future enjoyment of the public.

Highland County, Danville Life Saving Crew, and the Pittsylvania County Board of Supervisors reviewed and expanded their plans of work, establishing specific growth strategies for 2017.

Westmoreland County School System captured the comments of all its high school students and incorporated the students' vision into its building plan.

The Virginia Horse Industry Board established the foundation for its 2017 marketing plan.

Gloucester Parks, Recreation, and Tourism, the Upper Roanoke River Roundtable, and the Patrick Henry Foundation developed discussion outlines and clearly defined discussion processes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #4

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia is searching for tools to prepare volunteers, civic leaders, and elected/appointed officials to be the force for positive change within their communities. Virginia Cooperative Extension's (VCE) 2014 Unit Situation Analysis and Issues Reports revealed a clear need for more prepared community leaders. The communication and decision-making expected from community leaders must be fostered among youth, but the development continues with young adults and retirees. The need exists with both current community leaders and those of the future. Across all four Virginia geographic regions, 58 local units identified some aspect of this issue among their top priorities.

During the strategic planning 2009/2010 VCE listening sessions, concerns were identified related to the quality of life within communities, namely workforce, economic and leadership development; public service infrastructure; urban sprawl; and the ability to respond to emerging critical issues within local communities. Community groups asked how local residents could be empowered to create and drive positive change.

At the 2011 Virginia Rural Summit, the Shenandoah Valley Partnership CEO said, in some rural communities growth is slowed down by leadership. However, educational programs can respond to this issue by empowering the citizens. People have the inherent capacity to solve their own problems and that social transformation is within the reach of all communities" (Kellogg Foundation, 2009). Research supports this notion that community leaders need to be involved in the decision-making process and problem solving to help organize and develop their communities. Yet, there is often a lack of formal leadership training that equips community leaders with the skills necessary to effectively meet community needs (Tackey, Findlay, Baharanyi, & Pierce, 2004).

The greatest asset of a community are arguably its residents; thus communities must be equipped to respond to the various social, economic, and environmental changes they may face. Dallas Tonsager, Under Secretary for Rural Development at USDA, noted "building great communities requires local leaders with vision, drive, and the resources to succeed" (Tonsager, 2010). In general, community leaders understand what skills and characteristics are needed to serve their communities, and they understand community growth and prosperity are linked to a strong leadership network.

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, 2002).

What has been done

During 2016, Virginia Cooperative Extension professionals delivered leadership programs throughout the Commonwealth and nationally to more than 700 participants. Program topics included emergency preparedness, public issues, team building, organizational leadership, partnership development, leading as an elected official, community service, character education, positive communication, leading peers, and working with volunteers. For example, the Virginia Association of Counties (VACo) Certified Supervisor program offers three 2-day classes each year, and the strong support by VACo's leadership led to an additional training in 2016 on Issues Management: The Role of Leadership (delivered at the 2016 VACo Chairs & Vice Chairs Institute). Another example is the Step-Up Youth in Action / 4-H Innovation Leadership Academy,' which was piloted in Prince Edward County.

VCE's leadership training and counsel supported farmers market boards of directors, Master Gardeners, county-based agricultural groups and agricultural advisory committees, Virginia Master Naturalists, Virginia Beginning Farmer program, 4-H Master Volunteers, regional health coalitions, elected officials, county staff, county boards and committees (including emergency management teams and resource boards), as well as regional groups (such as the Appalachian Regional Exposition Authority and the Twin County Leadership Initiative).

Expanding on its service to Virginia citizens, Extension offered over 20 community-based leadership programs/presentations in 2016, including the Carver Project (Culpeper) where local elected officials, Extension agents, GWCARC board of directors, and volunteers are honing their own leadership skills and developing innovative response to the project's challenges and stimuli; Running for Public Office (Danville/Pittsylvania County); LX Council of business owners and chief operating officers' presentation on strategic planning and the use of SWOT (Blacksburg); presentation on Building Collaborative Teams for the Virginia School Wellness state team conference (Staunton); and an agricultural leadership panel for the Virginia Farm Bureau's Farm to Table symposium (Farmville).

National conference presentation forums included the Public Issues Leadership Development conference, the Association of Leadership Educators conference, Northeastern Society of Agricultural Research Managers meeting, the National Health Outreach Conference, the National Viticulture and Enology Extension Leadership Council meeting, Kansas State University's Staley School of Leadership Studies, and a symposium for the Department of Defense Education Activity (DoDEA).

Within the context of VCE, all of these leadership programs address the focus area of Cultivating Community resiliency and Capacity, and they are part of the strategy to achieve Goal 2: Develop

and deliver educational programming to improve capacity among community members to engage in community planning, decision-making, and community leadership.

Results

Among 467 individuals who reported on their experience with the VCE leadership programs, more than 95% reported an increase in their knowledge of leadership skills and characteristics. Although we often have less data on application of knowledge gained, 50 program participants indicated they increased their participation in community leadership roles, 50 participants indicated they increased their adoption of shared leadership practices, and 142 individuals reported an increase in effectiveness in their work with community-based groups.

Furthermore, among those who rated their favorability toward VCE leadership programs, 100% (n=60) indicated their favorability increased as a result of participating in the program. For those who responded to quality ratings, 89% (n=113) rated the leadership program as very "good" or "excellent." These short-term assessments relate to longer-term impacts. For example, 4-H youth report growth in their individual confidence in effectively leading and working with their peers, presenting to the elected officials, analyzing challenges, understanding the electoral process, serving as group and school leaders, and developing strategies for addressing community-based youth issues. Community projects have been successfully implemented such as the Washington County Fair where event and exhibit entries have increased by 23% and the Charles City County Fair secured a new location and increased its community support. In the VACo Certified Supervisor program, 100% of the county supervisors completing the 2016 courses reported an increased understanding of their leadership role, knowledge of county government, and role in engaging the public in issue-based discussions. Of the Virginia Master Naturalists completing the leadership trainings, 100% reported that they were better prepared to serve as chapter board members and had gathered new ideas for chapter growth.

Not only are community leaders improving their knowledge, they are also putting this understanding of leadership into action. The Carver project (Culpeper) secured $700,000 over the last three years to complete a feasibility study, purchase agriculture equipment, launch the planning process for a commercial kitchen, develop a museum in one of the renovated spaces planned for the school, and establish the Hops Trial by with 450 plants at Madison's Bald Top Brewing. In addition, among participants in the Running for Public Office' program (Danville/Pittsylvania), 4 ran for the Danville City Council in 2016, and 1 was elected.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #5

1. Outcome Measures

Community Food Systems: Increase the number of local communities partnering with Virginia Cooperative Extension faculty to strengthen the connection between local agriculture producers and growers with local food-related businesses and purchasing institutions

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Land Use Education Program

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

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 local comprehensive land use plans, and making land use permitting determinations at the local governmental level. Their effectiveness and awareness of best planning practices has profound impacts on the ability of Virginia's communities to meet the tripartite goals of economic development, environmental stewardship, and social capacity development. The 2011-2016 VCE restructuring plan identified community planning education as an important issue (Focus Area II: Sustaining Virginia's Natural Resources and the Environment and Focus Area V: Cultivating Community Resiliency and Capacity). Programming in this area helps to ensure well planned communities that are business friendly, thereby sustaining agriculture into the 21st century. Also a training needs assessment of VCE agents put land use issues in the 10 ten training needs.

What has been done
The Land Use Education Program (LUEP) was formed in 2013. The program is a partnership between Virginia Cooperative Extension and Virginia Tech's Center for Public Administration and Policy (CPAP). LUEP 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. LUEP's relationships with state-level partners like the Virginia Chapter of the American Planning Association ensure good communication and coordination between allied organizations, where little inter-organizational coordination existed in the past. Thus, in 2016, LUEP provided education to over 650 Virginians though webinars, face-to-face events, and mobile tours.

Results
One hundred and forty-nine (149) planning commissioners, BZA members, and others graduated

from our Certified Planning Commissioner and Board of Zoning Appeals programs. Of the 149 graduates, 60 individuals completed the six-month post-completion evaluation of LUEP graduates. Attitudinal shifts among respondents suggest training increases self-confidence with respect to the duties of serving as an appointed official. Twenty-one self-reports of job competency show increases in perceived job competence. Before the training 14 respondents reported no or little competency. Following the training, all 21 reported being competent or exceptional in their preparedness. Zero respondents reported no or little competency. Respondent self-perceived competency stemmed from increased self-confidence to work with others and planning laws, technical preparedness to carry out the duties and responsibilities of their appointment, and perceived opportunities to improve their community's planning administrative processes. Nine respondents reported that their community adopted planning best practices because of the LUEP training. Additionally, seven communities attributed some environmental benefit to their training. Five respondents say the training helped their community add or retain jobs in the community. Twelve respondents reported the training created new community leaders. Anecdotally, 2016 saw the entire planning commission of the Town of Lovettsville become Certified Planning Commissioner program graduates. Likewise, the Town of Purcellville became the first locality to have all Town Council members become LUEP graduates. LUEP is succeeding in its mission to inform the discretion of all Virginians to make wise land use decisions. Our graduates are more prepared to fulfill the duties and responsibilities of their appointments and they are being rewarded for their efforts by the public. In addition to serving our core audience LUEP has extended its capacity to serve the Commonwealth by partnering both internally within VCE/VT and externally. A key partnership has developed between land use and energy VCE programming because of the shared programming goals and alignment within the Natural Resource and Energy Management Planned Program Team. VCE quickly and comprehensively responded to the emergence of utility-scale solar â??farms'. As the need for local assistance grows, VCE is well positioned to provide key leadership in policy and planning technical assistance. LUEP has enhanced its program administration by creating a Leadership Advisory Council. Composed of program graduates and programming partners, the LUEP-LAC membership has begun the development of a strategic plan for the program. A situational analysis and SWOT analysis are currently underway. Externally, LUEP's partnership with allied organizations continues to expand. LUEP is now recognized as the educational provider for the APA Virginia Chapter. LUEP has again successfully delivered the most highly rated and well attended conference in APA Virginia history. Because of this partnership, the 2016 APA Virginia annual conference hosted nine faculty speakers from VCE and VT, including a key note speaker addressing the Flint Water Crisis. Other topics of note included: leadership, community food systems, urban forestry, and affordable housing. With a membership of over 1500, VCE is well positioned to bring our education to local governmental employees, elected, and appointed officials that can directly impact natural resource and energy issues. Opportunities now exist to add additional resources to LUEP programming and services.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development

Outcome #7

1. Outcome Measures

Agritourism in Virginia's New Economy

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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, based on the 2007 USDA farm census from agritourism and farm-related recreation in Virginia increased from $2.7 million in 2002 to $12.9 million in 2007. This same study concludes that 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 merit 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. Findings indicated that over 70 percent of the Virginia agritourism operations have increased revenues from agritourism functions.

What has been done

Virginia Cooperative Extension partners with Virginia Farm Bureau, Farm Credit, Virginia Tourism, Virginia Department of Agriculture and Consumer Services (VDACS), local economic development and zoning offices, and local financial and insurance offices to deliver the state agritourism conference and agritourism workshops in local communities. Extension has coordinated and hosted the 2015 and 2016 two-day conferences featuring over 40 speakers and

serving approximately 160 registered participants; offered 9 local agritourism workshops reaching over 200 agritourism entreprenerus; and engaged in one-on-one conversations with multiple farmers. Each conference and multiple county-based agritourism workshops are planned by a coalition of state/local agency representatives who contribute their time and invest their resources.

Extension maintains a statewide listserv and publishes agritourism resources. In 2016, Extension published the New River Valley Agritourims/Agribuisness Strategic Plan and offered it as a template for regional planning.

Two Extension agents were trained by the National Children's Center for Rural and Agricultural Health and Safety on promising practices for farm agritourism safety and delivered the training at the state conference and at several local workshops.

In 2016, at the request of the Virginia Secretary of Agriculture and Forestry, Extension partnered with the counties of Augusta, Halifax, Loudoun, and Rockingham and the New River Valley Planning District Commission to secure funding for the 2016-2017 Economic and fiscal impacts of agritourism in Virginia study. Each county contributed $12,000, Virginia Tourism provided $25,000, and a grant proposal to The Governor's Agriculture and Forestry Industries Development (AFID) Fund was submitted and approved for $24,000. The study was coordinated by Dr. Vincent P. Magnini, Virginia Tech, who served as the principle researcher; Ms. Esra Calvert, Director of Research for Virginia Tourism Corporation; and Dr. Martha Walker, Virginia Tech/Virginia Cooperative Extension.

The agritourism 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.

Results

Over 90% of the farms responding to evaluation requests reported an increase their knowledge and/or skills and indicate that their agritourism operations will expand the events and improve the marketing of the unique experiences offered by their farms. Agritourism entrepreneurs are networked through the listserv and are provided access to resources and support for building their businesses.

One Virginia farm received a $5,000 state grant for a marketing and business plan.

Virginia Department of Commerce and Trade and the Virginia Department of Agriculture and Consumer Services recognize agritourism as an economic development driver.

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. 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.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental 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

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

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
305	Animal Physiological Processes	0%	0%	10%	0%
501	New and Improved Food Processing Technologies	3%	0%	10%	30%
502	New and Improved Food Products	5%	0%	10%	10%
604	Marketing and Distribution Practices	5%	0%	5%	0%
702	Requirements and Function of Nutrients and Other Food Components	5%	0%	10%	30%
703	Nutrition Education and Behavior	38%	70%	0%	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%	30%
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: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	17.3	4.0	35.1	3.0
Actual Paid	17.8	2.0	89.4	3.0
Actual Volunteer	2341.0	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**
1679162	305636	1110039	581924
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
2171916	305636	3025266	775898
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
4704194	127264	16280404	72791

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. Improve access and availability to local, safe, affordable, and nutritious foods and beverages and physical activities
2. Promote markets, profitability, environmental stewardship, and health among Virginia producers
3. Offer educational programming to support outcomes 1 and 2 and reduce chronic disease
4. Pilot-test the northern Virginia Food and Fitness Initiative at the northern Virginia 4-H center for scaling up to other 4-H centers
5. Promote healthy, safe, active (decrease sedentary), "green" products, and local sourcing at VCE meetings

2. Brief description of the target audience

4-H youth, caregivers, 4-H center staff, food producers, farmers markets, VCE Agents

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	127862	250649	1705156	11276

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of sessions offered for producers intended to increase their knowledge about best practices on the farm,
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of 4-H youth, families and communities increase their knowledge of basic principles outlined in the Dietary Guidelines for Americans 2015
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Number of professional development session to VCE staff on safe food handling, healthy eating, reducing sedentary activity, and local sourcing of foods
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Educate youth and families on the causes and effects of chronic diseases, including obesity and sedentary lifestyles.
  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	Promote healthy, safe, active practices and use of "green" products, and local sourcing at VCE meetings.
2	Educate families to define dietary quality and select nutritious foods (multiple curriculum are used).
3	Pilot-test the northern Virginia Food and Fitness Initiative at the northern Virginia 4-H center for scaling up to other 4-H centers.
4	Promote recommended food, resource management, and farm practices and physical activity to improve health and decrease chronic disease
5	Starch nanocomposite films incorporating grape pomace extract and cellulose nanocrystal
6	Supporting Healthy Lifestyles Through Evidence-Based Programs for Better Health Across the Age-Continuum
7	VCE Home Food Preservation Expertise Prevents Illness, Reduces Public Cost across Virginia
8	Addressing a Critical Need for Diabetes Self-Management Instruction in Virginia
9	Controlling mosquito populations based on mosquito genetics and functional genomics
10	Spice processing protects food quality and safety from pathogens
11	Iron in bovine drinking water influences milk components and quality.
12	An Improved Representation of Dietary Phosphorus Requirements of Ruminants
13	VCE Trainings Enhance a Stronger Fresh Produce Food Safety Culture in Virginia
14	Transforming African-American eating habits through Superfood Kale Salad demonstrations

Outcome #1

1. **Outcome Measures**

   Promote healthy, safe, active practices and use of "green" products, and local sourcing at VCE meetings.

   Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

   Educate families to define dietary quality and select nutritious foods (multiple curriculum are used).

   Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

   Pilot-test the northern Virginia Food and Fitness Initiative at the northern Virginia 4-H center for scaling up to other 4-H centers.

   Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

   Promote recommended food, resource management, and farm practices and physical activity to improve health and decrease chronic disease

   Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

   Starch nanocomposite films incorporating grape pomace extract and cellulose nanocrystal

2. **Associated Institution Types**

   - 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Food safety is a principal concern of the food industry. Microbial growth on the surface of foods is an important issue because this is the primary source of contamination and spoilage for many refrigerated food products. Antimicrobial agents incorporated into food packaging films may potentially control the growth of pathogenic and spoilage microorganisms. Combining antimicrobial agents with nanocomposite film is particularly desirable because nanofillers improve the structural integrity and barrier properties of starch-based biodegradable film. The utilization of grape pomace extract as a naturally occurring antimicrobial agent in combination with biodegradable nanocrystals derived from crop by-products or agricultural wastes will address issues related both to food safety and to sustainable agriculture.

What has been done
Researchers have conducted studies to (1) prepare antimicrobial starch nanocomposite films that incorporate grape pomace extract and cellulose nanocrystal using solution intercalation, and (2) investigate the nanostructure and functional properties of those films. Cellulose nanocrystal (CNC) were uniformly dispersed throughout the starch matrix. The nanocomposite films had increased thickness, mechanical properties, and opacity. As the grape pomace extract (GPE) content of the films increased, they became darker and more red and yellow in hue. Higher CNC amounts in the film significantly reduced water permeability but increased the phenolic compound release. The films with higher GPE levels presented higher inhibitory effect against both L. monocytogenes ATCC 7644 and S. aureus ATCC 29213. The film that incorporated 10% CNC and 4% GPE shows the most promise for food application because it has the highest levels of brightness and transparency, mechanical strength, and antibacterial activity, as well as the lowest water permeability.

Results
? The use of grape pomace extracts in creating packaging films for processed meats has the potential to economically benefit local grape producers and the wine industry by increasing profits through the value-added utilization of by-products , as well as by reducing disposal costs through reducing the volume of the waste stream.

? The use of packaging films made with CNC and GPE will benefit food and other industries by using natural compounds in their products, which may be appealing to consumers because of their concerns about the synthetic compounds.

4. Associated Knowledge Areas

KA Code	Knowledge Area

501	New and Improved Food Processing Technologies
502	New and Improved Food Products
702	Requirements and Function of Nutrients and Other Food Components

Outcome #6

1. Outcome Measures

Supporting Healthy Lifestyles Through Evidence-Based Programs for Better Health Across the Age-Continuum

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Lifestyle behaviors including diet and physical activity affect the health of Virginians across the age continuum. Improving health behaviors requires a multi-pronged, coordinated approach using strategic programming and evaluation tools. Current programs available through VCE to address the major health priorities for the state including obesity, diabetes, cancer, and heart disease are insufficient. Chronic disease prevention and management are priority areas nationally and within Virginia and provide the opportunity for VCE to seek external funding, formation of coalitions to address these issues collaboratively, and increased public awareness.

What has been done
Two strategies were used to increase the capacity of Extension Agents to provide effective healthy lifestyle programs in Virginia communities; (1) identify and provide orientation to evidence-based lifestyle change programs, and (2) promote healthy lifestyles within Cooperative Extension. The Food, Nutrition and Health Program Team identified, promoted, and evaluated outcomes of 4 evidence-informed programs promoting healthy lifestyles for the reduction of obesity and chronic disease in adults, FitEx, L.I.F.T., the Diabetes Prevention Program, and Balanced Living with Diabetes. Fifty-five Extension Agents were trained in 2016 to deliver these selected programs. Teen Cuisine, developed by the Virginia Family Nutrition Program for low income youth, is a skill-based curriculum that focuses on food preparation and safety and has been used to reach 12-18 year old youth.
Virginia 4-H has received a $35,000 grant from the National 4-H Council and the Walmart

Foundation, to provide training and resources to 4-H and Family and Consumer Science Extension Agents throughout Virginia who serve low-income audiences to implement Teen Cuisine. Programming for that grant began in September and was completed in August 2016.
To promote an internal environment of healthy lifestyles and appropriate examples of healthy living to VCE clientele, the VCE Healthy Meetings Pledge was developed. The Pledge includes guidelines for conducting healthy meetings and a checklist for documenting healthy meetings activities.

Results

Extension Agents delivered 4 evidence-based curricula to 604 Virginia residents. These four programs resulted in measurable improvement in healthy behaviors including physical activity and fruit and vegetable intake that were accompanied by improved physical capacity, weight loss, and blood sugar control. Details are as follows:
L.I.F.T.: Delivered by 6 agents to 139 participants in 7 counties; participants showed improvement across all functional fitness measures (upper and lower body flexibility and strength as well as a composite balance score).
FitEx was delivered by 8 agents to 324 participants in 39 Virginia localities. Lifestyle change outcomes included a doubling of fruit/vegetable consumption (from a half cup to a full cup) and a tripling of the average minutes walked per week (from 32 to 93 minutes per week). This was accompanied by a doubling in the average miles walked weekly (3.2 miles to 6.2 miles per week).
Sixteen Balanced Living with Diabetes programs were conducted in 15 rural counties to 141 Virginia residents. Of the 62 participants that provided follow-up information, 15 (24%) showed clinically significant improvement of their blood sugar. Six of 22 (28%) diabetic participants with poor blood sugar control (A1c > 7%) at the start of the program, improved their blood sugar control into the recommended range (A1c < 7%). An additional 11 out of 34 (32%) participants with blood sugar in the pre-diabetic range (A1c = 5.7 - 6.4) saw a reduction to normal (A1c< 5.7). 61% (41/62) of participants lost weight, with an average weight loss of 6.9 pounds (range: 0.2 - 45.3). 60% of participants reported an increase in their fruit and vegetable consumption, and 52% reported an increase in their weekly exercise.
Three Diabetes Prevention Programs have been started in 2 counties, with a total participation of 32 Virginia residents. Outcomes will be assessed in the coming year.
A diverse group of over 10,500 youth between the ages of 12-18 participated in the Teen Cuisine program across the state. Positive changes in knowledge and behavior resulted from participation including increased knowledge of healthy food choices (94%) and change to healthier food choices (72 - 74%). Participants indicated that the ate more fruits and vegetables (82%), whole grains (71%),less junk food (56%), drank less soda (63%) and more water (86%). The majority also reported that they used recipes and cooked more (75% - 78%) and improved their knife skills (92%).

In addition to the curricula targeted by the Program team for promotion and evaluation, Extension Agents across Virginia implemented 41 other distinct curricula targeting healthy lifestyles in youth and adults, 11 of which were developed by Extension faculty. Twenty-four Extension Agents reached 19,507 people with healthy lifestyle programs. Of those, 10,310 were under 18 years of age, 7,607 were aged 19-64, and 1,590 were over 65 years of age.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

VCE Home Food Preservation Expertise Prevents Illness, Reduces Public Cost across Virginia

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The number of consumers preserving foods at home continues to increase as more consumers emphasize greater control over what they eat and where their food comes from. Failure to adequately preserve foods in the home can result in food-borne illness. Food-borne botulism is a severe form of food poisoning. Most of these cases are associated with improperly processed home-canned food. Just one case of botulism can cost $1,680,903 related to medical services, deaths, lost work, and disability. In order to prevent illness, it is essential that consumers follow validated recipes when preserving foods at home. Extension educators are recognized as a credible resource for home food preservers.

What has been done
To help ensure safe home food preservation methods, Virginia Cooperative Extension agents in 45 counties provided food preservation trainings and support in 2016. 622 individuals attended general classes on home food preservation. Some received more in-depth training including:
331 individuals attended hands on boiling water bath canning classes for canning high acid foods (jams, jellies, pickles, fruits, etc...).
183 individuals attended hands on pressure canning classes for canning low acid foods (vegetables, meats, fish, etc.).
28 individuals attended hands on fermentation classes
303 individuals attended freezing and/or dehydrating classes
Additionally, VCE provided pressure canner dial gauge inspection for 134 residents and provided one-on-one individualized home preserver support via phone/e-mail to over 400 residents in across Virginia.

Results

Home food preservers completing education through VCE programs were evaluated to determine their knowledge gain in safe home food preservation techniques and how the training impacted their future behaviors. Over 92% of Virginia residents working with VCE increased their knowledge on how to preserve foods safely at home. Follow up discussions with several participants revealed that even long time home canners were using unsafe canning methods. Canning low acid foods using the water bath method carries a botulism risk, at least two participants confessed to using this method and that they were going to change this behavior. One specific comment was: "I have canned for years, but I learned so much last night about safely canning and available resources, I feel even more confident moving forward".
Use of an inaccurate gauge can lead to under processed foods which could create a botulism risk. Of those tested, 46 (34%) were inaccurate and recommended to be replaced. It is assumed that if one case of botulism can be prevented through replacement of an inaccurate dial gauge, the potential annual savings to the State of Virginia can be approximately 77 million dollars.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety

Outcome #8

1. Outcome Measures

Addressing a Critical Need for Diabetes Self-Management Instruction in Virginia

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Diabetes is the seventh leading cause of death in the US, and the leading cause of kidney failure, lower-limb amputations, and adult-onset blindness. More than 20% of health care spending is diabetes related, and the prevalence of diabetes has increased at an alarming rate, soaring by 45% between 2001 and 2010. Currently there are 29 million U.S. adults living with diabetes, and 86 million with pre-diabetes. Diabetes is a National priority, and significant efforts are being made to prevent diabetes and help those with the disease live healthier lives.

Over half a million Virginia adults were living with diabetes in 2013, with an annual diabetes related death rate of 18.8%. The primary driver of diabetes, overweight/obesity, is found in 62% of Virginia adults. At the same time, only 20% of adults eat the recommended 5 daily servings of fruits and vegetables, and only half meet exercise guidelines.
There is a critical need for accessible, effective lifestyle change programs for people with diabetes to change the trajectory of these statistics.

What has been done
Virginia Cooperative Extension has formed a unique collaboration with diabetes educators, healthcare organizations, local departments of health, and community organizations to bring evidence based diabetes self-management education to resource limited rural counties in Virginia. The Balanced Living with Diabetes Program is a five session lifestyle change program that spans 3 months and leads participants through a process of developing healthy diet and activity behaviors that result in improved diabetes management.

Results
Sixteen Balanced Living with Diabetes programs were conducted in 15 rural counties in 2016. Four of these programs will have their final session in 2017. A total of 141 Virginia residents participated in these programs statewide. Participants ranged in age from 24 to 87 years (average 62 yrs), were 79% female, and were of an ethnic mix similar to the state (24% Black, 75% White) The majority (70%) had less than a college education and an annual income of less than $40,000 (55%). Most of those who took the program were either diabetic (n=94) or pre-diabetic (n=22), but it was also of interest to people whose loved ones were diabetic.
Improving blood sugar control is key to better health for people with diabetes. Of the 62 participants who provided follow-up information, 15 (24%) showed clinically significant improvement of their blood sugar, measured by a reduction in hemoglobin A1c (A1c) of ≥ 1.0. Six of 22 (28%) diabetic participants with an A1c greater than 7%, considered poor blood sugar control, improved their A1c to below the recommended 7%. An additional 11 out of 34 (32%) of participants with A1c between 5.7 - 6.4 saw a reduction into the normal range (< 5.7).

Weight control is very important for the control of diabetes. Weight loss often occurs as a result of the lifestyle changes recommended by the BLD program. 61% (41/62) of participants who provided follow-up information lost weight, with an average weight loss of 6.9 pounds (range: 0.2 - 45.3). This can be attributed to better health behaviors. 60% of participants reported an increase in their fruit and vegetable consumption, and 52% reported an increase in their weekly exercise.
Cooperative Extension will continue to target diabetes as a priority for lifestyle education programming in the coming year. We look forward to strengthening our collaboration with our current community partners, including 8 healthcare organizations, a regional food provider, the YMCA, and local Health Departments to continue to offer the Balanced Living with Diabetes program on a regularly scheduled basis. This will improve the health of Virginia residents with diabetes, reduce healthcare costs, and increase the length and quality of their lives.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Controlling mosquito populations based on mosquito genetics and functional genomics

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	2016

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Mosquito transmitted diseases, such as malaria, dengue fever, and encephalitis claim millions of lives worldwide each year. Aedes triseriatus (Say), Aedes japonicus (Theobald), Aedes albopictus (Skuse), and Aedes aegypti (Linnaeus) are among the mosquitoes of greatest public health concern in the United States. All are competent vectors of arboviral diseases as well as being significant biting pests and are sympatric in many locations. Current control measures are under threat as drug- and insecticide-resistance increases. Novel approaches are needed and needed urgently. Ovitraps are widely used for population monitoring, disease surveillance, and evaluation of control activities. However, because different combinations of the 4 species are sympatric and, indeed, may occur in the same ovitrap, it can be difficult to determine the relative species composition. A method to differentiate the eggs of theses important vectors directly would be more efficient and cost effective.

What has been done
Laboratory studies of the basic genetics and physiology of mosquitoes are targeting the long-term goal of reducing the burden of vector-borne infectious diseases. Virginia Tech researchers are developing a novel synthetic gene drive system called MEDEA (Maternal-effect dominant embryonic arrest) for efficient and safe spread of refractory genes in mosquito populations to control infectious diseases. The approach is an investigation of the mechanism of Y gene function, which may lead to mosquito control applications through the manipulation of sex ratios and mating behavior. Exploration of the applications of mobile DNA, as molecular tools to manipulate mosquito genomes, is for the purpose of interrupting transmission of pathogens. The team is also investigating the functions of microRNAs and their involvement in infection and mosquito development. Identification of species in ovitraps was investigated by photographs taken using a Wild Photomakroskop M 400 microscope on JVC KYF75U 1/2? 3-CCD digital capture video camera and Syncroscopy Auto-Montage Pro imaging software. This software produces a perfectly focused composite single image from a series of images focused at different

heights on the specimen. Measurements were made using the Auto-Montage Pro measurements option. Eggs were also examined by scanning electron microscopy.

Results

The research team has identified several Y chromosome genes in Anopheles mosquitoes and obtained transgenic lines of two of such genes and showed that all transgenic offspring are males. They are investigating the mechanism under which these genes function and actively developing ways to manipulate sex ratios to control Anopheles mosquito population. They have also discovered genes linked to the male-determining locus in the dengue and yellow fever mosquito, Aedes aegypti and demonstrated that one of these genes is the male-determining factor. With that knowledge, they are developing ways to manipulate sex ratios to control Aedes population. Morphological characteristics were identified through imaging software that will permit the reliable identification of the four sympatric aedine species as eggs collected from ovitraps to species using a standard stereomicroscope. This approach eliminates the need to rear trapped mosquito eggs to adulthood, thus reducing labor and time (2 or more weeks) while providing an accurate count of the vector mosquitoes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes
721	Insects and Other Pests Affecting Humans

Outcome #10

1. Outcome Measures

Spice processing protects food quality and safety from pathogens

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	2016

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Salmonella enterica has been recovered from a number of low water activity foods including spices. Spices may be treated with steam
and/or ethylene oxide to reduce microbial loads. Therefore, improved recovery of viable Salmonella in treated spices is needed to ensure processes are properly validated. Effectiveness

of processes should protect spice quality while effectively destroying pathogens and reducing bacterial load.

What has been done

The efficacy of laboratory-based recovery methods for the Salmonella pathogen on peppercorn and cumin seeds treated with steam and ethylene oxide was evaluated. Salmoella-inoculated peppercorns and cumin seeds were processed and assessed for pathogen recovery. Uninoculated peppercorns, cumin seeds, oregano flakes, and onion powder were processed by steam, ethylene oxide, and irradiation and evaluated by sensory and analytical methods to determine if pathogen-destructive methods protected spice quality.

Results

The Salmonella recovery method with TSA supplemented with SPY or TDP resulted in better recovery of Salmonella from steam-treated peppercorns (P<0.05). No supplement was associated with improved recovery of Salmonella on cumin seeds (P>0.05) following steam treatment. For ethylene oxide-treated peppercorns and cumin seeds, no supplement improved recovery of Salmonella (P>0.05) Significance: For steam-treated peppercorns, supplementation of TSA with sodium pyruvate + yeast extract or 3,3?-thiodipropionic acid may improve recovery of Salmonella when overlay plating methods are used. Irradiation did not contribute to noticeable differences in visual or odor sensory quality of peppercorns, cumin seeds, or oregano but did alter onion powder. Steam processing affected odor of peppercorns whereas ethylene oxide did not alter peppercorns. Odor and visual differences were observed for cumin seeds processed by ethylene oxide but steam processing only affected visual quality. An important parameter of process validation for destruction of pathogens is verification that product quality is maintained.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety

Outcome #11

1. Outcome Measures

Iron in bovine drinking water influences milk components and quality.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	2016

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Milk is composed mostly of water. In order for dairy cows to produce milk, they must drink approximately 25 to 30 gallons of water per day. Unlike the water used for human consumption, the water that cows drink is not typically tested for quality and safety measures. The most common source is groundwater. In many areas of the United States, groundwater contains iron and other minerals at levels higher than the United States Environmental Protection Agency?s (USEPA) secondary maximum contaminant levels (0.3 mg of iron per liter of water). Even some potable water sources exceed the US EPA?s recommendation. We studied the effect of excess iron intake on milk proteins and milk quality. Specifically, the interaction of water-sourced iron, at low, medium and high levels) on milk proteins and implications on milk oxidative state and mineral content was studied.

What has been done

Raw milk was collected from 4 dairy cows receiving water at low, medium, and high levels compared to a control water. Milk was processed in a pilot-scale processing plant at the university and stored frozen until further evaluation. Milk proteome, oxidative stability of milk, and milk mineral composition was evaluated. For comparison, iron at the same levels was added to commercially processed fluid milk.

Results

Although no measurable changes in total iron concentration occurred in the milk of cows drinking water with iron contamination, the effect on milk proteins illustrates that milk quality is affected. The effect on milk casein and the whey proteins in milk of lactating dairy cows illustrates that the cow is responding to high iron concentration in water sources. Changes in proteins within milk has implications to milk and dairy product quality. Cheese and yogurt processing is dependent on milk protein composition. Lower milk casein may reduce cheese or yogurt set and yield; changes in whey proteins may affect flavor quality. Changes in oxidative stability also may lead to off-flavors in milk or cream and further processed products.

4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes
502	New and Improved Food Products
702	Requirements and Function of Nutrients and Other Food Components

Outcome #12

1. Outcome Measures

An Improved Representation of Dietary Phosphorus Requirements of Ruminants

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	2016

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Excessive phosphorus and nitrogen in streams and other bodies of water lead to water quality problems. A significant proportion of the phosphorus flowing into these surface waters derives from human and and animal activity including meat and milk production. Minimizing the impact of animal production on water quality requires that feeding programs be designed to more precisely meet phosphorus requirements. Historical phosphorus requirement models have assumed that all forms of phosphorus are equally available to ruminants. However, evidence exists that phytate and other organic forms of phosphorus are potentially less available to the animal that inorganic phosphorus. Development of a phosphorus supply prediction system that accommodates variable phosphorus absorption efficiency would potentially yield more precise feeding programs by accounting for availability differences among differing ingredients.

What has been done
In previous years, a model was developed that describes the digestion and absorption of phosphorus in phytate, other organic, and inorganic forms. After fitting the model to data collected by collaborators, it more accurately described phosphorus availability to the animal. The model of phosphorus digestion and absorption was utilized to predict phosphorus bioavailability values for a large number of ingredients commonly fed to cattle in the US.

Results
The bioavailability values were utilized to solve a range of feeding programs typical of the US industry and compared to feeding programs designed with the old phosphorus supply prediction system. The new system was able to better discriminate among ingredients and thus feeding programs could be designed to achieve lower phosphorus intakes with greater confidence. This new system can be used in ration balancing software to successfully feed lower phosphorus diets which reduces phosphorus in excreted manure and reduces exogenous phosphorus feeding leading to reduced environmental impact.

4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes
501	New and Improved Food Processing Technologies
702	Requirements and Function of Nutrients and Other Food Components

Outcome #13

1. Outcome Measures

VCE Trainings Enhance a Stronger Fresh Produce Food Safety Culture in Virginia

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Foodborne disease outbreaks associated with fresh produce have increased in recent years. These increased outbreak contributed to the implementation of the Food Safety Modernization Act (FSMA) and its resulting rules, which were finalized in 2015. These rules significantly change the regulatory environment for produce growers. The marketplace now has stiffer food safety requirements. Growers selling to larger buyer channels and institutions are often required to obtain a Good Agricultural Practices (GAP) certification audit and some must comply with FSMAâ??s Produce Safety Rule (PSR). To comply, produce growers must receive specific training authorized by the rule. In contrast, growers selling through direct market channels do not need certification. Regardless of market outlet requirements and the size of a produce farm, access to food safety education is crucial. Training and resources must be relevant, research-based and geared to particular audience needs. This will lead to the adoption and implementation of best practices that reduce risks, thereby strengthening the food safety culture among fresh produce growers. Ultimately, Virginia-grown produce will be safer, linked to fewer recalls and foodborne outbreaks, resulting in less economic loss for the state.

What has been done
"Enhancing the Safety of Locally Grown Produce" was provided for 125 produce growers and market managers. Another 175 growers were trained in navigating food safety requirements and

certifications including market sector training and handling requirements. 77 growers received higher-level trainings related to on-farm and marketplace food safety risks, GAP, and/or safely operating produce packing facilities. PSR- awareness sessions were delivered to 500 growers, 21 extension agents, and 45 state/county/city officials. 55 growers received training in the PSA.

Results

Pre-post results show a 33% knowledge gain among FSMA PSR participants. Moreover, 30 growers learned to conduct an on-farm risk assessment, identify risks, implement GAP, and develop food safety plans. Five of them went on to pass third party audits, thereby opening new markets for their products. Growers attending other hands-on workshops increased their knowledge, and intend to: provide more food safety training for workers; test quality of irrigation water; improve handwashing and toilet facilities for workers; improve cleaning and sanitizing methods on farm or packing house; incorporate ways to control/monitor animals on farm/packing/storage area; document food safety practices, and use safe methods (temperature control, sanitation etc.) for storage and transport of product to marketplace.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety

Outcome #14

1. Outcome Measures

Transforming African-American eating habits through Superfood Kale Salad demonstrations

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to Ewing (2015), typical African-American daily food preparation contains more meat rather than produce, and most often involves frying and serving foods with gravies and sauces containing high amounts of sodium, fat and sugar. Often referred to soul food, or comfort food, the typical African-American diet has resulted in poor health indicators. According to the National

Centers for Disease Control, African-Americans are indeed suffering from their unhealthy diets: 37.6% of men and 56.9% of women 20 years or older are obese; 40.9% of men and 44.8% of women over 20 years of age have high blood pressure, or are currently taking blood pressure medication. The leading cause of death for African Americans is heart disease.

What has been done

To address poor eating habits of African-Americans in Virginia, the VSU Cooperative Extension's Culinary Expert, Ms. Wanda Johnson, has developed an innovative nutritional outreach demonstration involving the following:
? Health-conscious eating with the USDA Plate nutritional guidelines;
? Heart healthy foods to enjoy; and
? Incorporating superfood through a Kale Salad recipe.

Results

? 675 African-American participants raised awareness of the USDA Plate, where ½ of their meal plate must contain produce
? 450 African-American participants changed their weekly diet behavior by making the personal decision to prepare the superfood kale salad for weekly family meals
? 338 African-American participants who were concerned about their heart health believed that after the presentation eating the prepared superfood kale salad weekly would improve their overall good health
? Educational demonstrations at local farmers markets earned 12 small farmers $700 of additional income (a minimum of $8,400 or more) over the market season by having the superfood kale salad recipe card on their market display for customers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Government Regulations

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 # 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%	60%
111	Conservation and Efficient Use of Water	5%	0%	5%	30%
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%	0%
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%	10%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	37.8	2.0	53.0	1.0
Actual Paid	39.0	1.0	58.4	2.0
Actual Volunteer	5361.0	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**
1095535	194890	724223	387949
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1417023	194890	1973774	581924
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
3069158	0	10621825	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?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	161796	513569	123520	16291

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	6	20	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational programs offered.

Year	Actual
2016	704

Output #2

Output Measure

- Number of educational materials and curriculas developed

Year	Actual
2016	360

Output #3

Output Measure

- Identifiable impacts reported by agents/specialists

Year	Actual
2016	57

Output #4

Output Measure

- Number of counties where drinking water clinics are held.

Year	Actual
2016	64

Output #5

Output Measure

- Number of participants in drinking water clinics.

Year	Actual
2016	6362

Output #6

Output Measure

- Number of drinking water samples tested.

Year	Actual
2016	2556

Output #7

Output Measure

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

Year	Actual
2016	22

Output #8

Output Measure

- Number of programs for landowners which address the impacts of BMP implementation on water quality.
  Not reporting on this Output for this Annual Report

Output #9

Output Measure

- Number of SHARP Logger Programs which address the impacts of BMP implementation on water quality.

Year	Actual
2016	21

Output #10

Output Measure

- 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.
  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	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 ways to increase value and profit.
3	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.
4	Increase the number of private landowners with a certified nutrient management plan before initiating forest management practices and implement a BMP.
5	Logging professionals protect water quality during logging operations by properly implementing all appropriate BMPs and maintaining riparian buffers.
6	Small lot owners adopt stewardship practices that enhance ecosystem services.
7	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.
8	Research climate change adaptation techniques for vegetable producers that will result in recommendations for the use of strip tillage as a climate change adaptation strategy in the US and abroad.
9	Potential use of purslane to cleanup environmental chromium-6 contamination
10	Increase acreage using conservation practice on cropland
11	Increasing the agricultural nutrient management on cropland
12	Reducing Urban Nutrients -- Healthy Virginia Lawns
13	Forty Years of Fall Forestry & Wildlife Field Tours Increase Implementation of Sustainable Woodland Management Practices

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
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Inefficient processing, handling, and use/disposal of waste by-products are contributing to air and water quality degradation and potential food chain impacts. Improperly handled animal (manure) and human (sewage sludge) waste results in volatilization of ammonia, whose re-deposition increases surface water eutrophication. Waste disposal methods such as incineration generate nitrogen oxides (NOx) which can be harmful to human health and damage vegetation. Landfilling of organic wastes produces the greenhouse gases CH4 (methane) and N2O (nitrous oxide). Other constituents and biological agents in land-applied wastes can potentially impair soil, water and food quality. Antibiotics and other organic micro-constituents can possess endocrine system disrupting activity. Such compounds may accumulate in soil, be assimilated by food and feed crops, and be transported to water. Disease-causing organisms, termed pathogens, may also be transported from land-applied wastes to drinking water supplies. Efficient composting of waste by-products will reduce the detrimental environmental effects of the commonly employed processing, processing, handling, and use/disposal methods. Furthermore, substitution of the stabilized compost product for uncomposted manures and biosolids, synthetic fertilizers and other materials can reduce soil, water and air degradation.

What has been done
Conducted 8 short courses for composting and nutrient management professionals. Eighteen compost professionals received comprehensive information during a 5-day composting school in preparation for conducting best composting practices, furthering their career, and passing the Maryland Compost Operator?s Proficiency Examination. A critical component of the Urban Nutrient Management training includes the proper use of compost in urban landscapes.

Results

Knowledge was gained from short courses and workshops. Number of certified composting professionals and nutrient management planners passing tests: 13out of 14 (93%) students in the Wastewater 4 Level Virginia Tech-Department of Environmental Quality Wastewater Operator?s Short School, where biosolids composting and use were taught, passed their final examination. DCR certified 18 new Urban Nutrient Management Planners in 2016, bringing the total number of planners for the program since its inception to 174 certified in the Turf and Landscape Category. A critical component of the Urban Nutrient Management training includes the proper use of compost in urban landscapes. From the most recent DEQ reporting period (CY2015), 166,352 tons of organic residuals were composted by permitted compost and other waste management facilities in Virginia. Partially due to our education awareness, operator training programs, and regulatory inputs, this is an increase in composting mass over time (2008: 35,721 tons composted; 2013: 142,191 tons composted). Thirty tons of food (poultry) processing waste from George?s Edinburg (VA) location were successfully composted and applied to farmland, keeping the organic residual out of the landfill and improving soil quality. Nearly all of the organic residuals being composted are expected to be applied to agricultural, urban and disturbed lands. Use of such recycled organic residuals reduces the reliance on energy-intensive fertilizer manufacturing and improves soil quality via the addition of organic matter to soil.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
403	Waste Disposal, Recycling, and Reuse

Outcome #2

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #3

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
2016	64

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), faculty in Biological Systems Engineering (BSE) coordinate clinics in about 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. Sixty-four (64) drinking water clinics were held serving participants from 78 counties in 2016. This year, 2554 samples from private water supplies were tested, a 48% increase from 2015.

Results
The sampled systems provide water for 6,362 Virginians. Statewide, in 2016, about 39% of all samples did not meet the EPA standard for public systems for total coliform bacteria, 6% were positive for E. coli, and 10% 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=21%), 70% 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 installing or improving the function of water a treatment device (33%), followed by shock chlorination (26%), pursuing additional testing (13%) and performing maintenance on well (12%). Nearly 80% of clinic participants report having never tested their water previously (45%) or testing it only once before (35%). Participation in a VAHWQP clinic is designed encourage subsequent, annual testing using a commercial lab. If delivered commercially, the value attributed to the VAHWQP drinking water clinics offered in 2016 would be $817,280. The cost to the 2016 participants was $132,800, 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 #4

1. Outcome Measures

Increase the number of private landowners with a certified nutrient management plan before initiating forest management practices and implement a BMP.

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Small lot owners adopt stewardship practices that enhance ecosystem services.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Traditional forestry education programs tend to involve long lab exercises, inclement weather conditions (i.e., freezing temperatures, torrential downpours, wind, snow, etc.), getting lost in the woods, tearing boots up in briars, picking ticks off pant legs, and being bombarded by mosquitoes. It's all part of the initiation. But what about forestry education for those who are not interested in becoming professionals, those who are interested in doing what is best for their woodlands and understanding how to communicate with natural resource professionals about woodland management issues? Or those who do not live on or near their land? Do they need to be initiated as well? Or is an alternative learning environment suitable for these folks?

What has been done

The Virginia Forest Landowner Education Program (VFLEP) launched the first on-line woodland management short course in January 2002. The reasons for developing this course included the increasing importance of on-line education at major universities, the growing number of absentee landowners not able to attend traditional VCE programs, the advancing age of many landowners, and the busy schedules of many young, newer landowners.

On-Line Woodland Options (OWO) for Landowners is a 12-week self-paced course designed to reflect the content of traditional woodland management classes for landowners that are delivered in person. Along with the lead instructor, a group of mentors also assist with the class. Mentors include natural resource professionals from various state agencies, such as the Virginia Department of Forestry, Virginia Department of Game and Inland Fisheries, Virginia Tech Forestry Department, Virginia Cooperative Extension, and West Virginia University, as well as forestry consultants, and experienced landowners. Mentors are chosen from across Virginia and neighboring states so they are able to address regional issues for the students.

The on-line class consists of 6 learning modules, each 1 to 2 weeks long, based around the following learning objectives:

1.developing a clear vision of property management goals;
2.understanding the social, economic, and biological limits to management goals;
3.locating boundary lines
4.reading a topographic map, aerial photo, and soil survey and understanding their applications to forest management;
5.identifying common tree species and basic forest cover types;
6.identifying specific management units;
7.developing a plan of action for each management unit;
8.knowing how to contact local and regional natural resource management assistance agencies.

Each module contains reading materials, a tree identification section (5 common Virginia species per module), a quiz to test knowledge gained, and an evaluation. To help alleviate feelings of isolation in the on-line classroom environment, and encourage interaction with the class mentors, weekly participation on Discussion Boards is also required. The instructor posts questions on the Discussion Board to stimulate conversation; however, students are encouraged to post their own questions, comments and experiences.

Optional advanced assignments are also included with each learning module. These are designed for students with ready access to their property to give them hands-on experience applying some of the principals learned in the course. Advanced exercises include locating property boundaries and determining the land use history of the property,

To date, OWO has been offered 13 times. A total of 822 students have participated. As expected, the majority of the students were from Virginia; however, there were students from across the Southeast and Mid-Atlantic States as well. These students owned over 62,000 forested. Sixty-six percent of the landowners were absentee, i.e., the forestland was not their main residence. Absentee landowners traveled an average of 107 miles to get to their property.

In 2014, a follow up survey was sent out to folks who participated in the class between 2002-2009. Survey questions were based on questions asked in the National Woodland Owner Survey

(NWOS), the official landowner census administered by the USDA Forest Service, allowing us to compare our results with theirs.

Results

Of the general Virginia woodland owner population that responded to the NWOS, 15% had sought woodland management advice. Before taking the OWO course, approximately 39% of the participants had sought management advice (higher than the general population, but still low). However, after completing OWO, 90% of the participants had sought professional management advice. Similar results were found for those seeking advice on timber harvesting. Numerous studies have shown that landowners who work with a professional in planning a timber harvest report greater satisfaction, greater revenue, and healthier more valuable forests following harvests. This translates into an improved natural resource and real dollars in the pockets of Virginia woodland owners who sell timber.

The NWOS reports only 4% of the general Virginia woodland owner population have a written management plan. The folks participating in OWO tend to have a higher rate of management plans even prior to taking the class (21%). However, this percentage increases to 60% after completing the class. Having a written management plan not only allows landowners to qualify for numerous state and federal cost share programs, it is also an entry point for landowners who want to certify their woodland management. With an increasing number of end customers, such as Time Warner Inc., demanding their paper be from certified sources, mills are actively seeking woodland owners with certified wood. As such, having a certified forest can result in increased marketability of woodlands.

Of course, having a written management plan on a shelf does nothing to improve the quality or sustainability of the forest resource. That takes implementation of the activities in the plan. And, it turns out, participants in the OWO folks are implementing sustainable woodland management practices. Over 65% of OWO participants report harvesting timber (compared with 15% reported in the NWOS), over 60% have done road and trail maintenance which helps reduce erosion and protect water quality (compared with 12% NWOS), almost 50% have improved wildlife habitat (compared with under 10% NWOS). In addition, 30% of OWO participants reduced or eliminated invasive plants, 9% reduced unwanted insects or diseases, and 9% used prescribed fire as a management tool.

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

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
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Excess nutrient export to aquatic ecosystems is a crucial socio-ecological problem. Dead zones negatively affecting fisheries and ecosystem function are documented in coastal ecosystems around the world, and result from high population urban centers and agricultural production. Over the last 30 years agricultural intensification, subsequent fertilizer use and urban development have led to increased nutrient delivery to water bodies. For example, nitrate export to estuaries has tripled between 1980-1999, relative to the 1955-1970 period. 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

The goal of this project is to develop a quantifiable, predictive framework that couples biogeochemical and hydrologic drivers of terrestrial nutrient export with CC to evaluate the effects of ecosystem management on estuarine function and costs of water quality protection. Virginia Tech researchers proposed to work broadly across common regional Chesapeake Bay (CB) watershed physiographic gradients and dominant landuses (e.g., agriculture, forest and urban). Goals included: 1. Bracket the mid-century changes in climate for the CB with downscaled high-resolution regional climate models. 2. Evaluate likely changes in landscape patterns and magnitudes of N and P cycling and erosion using downscaled climate model outputs coupled to multi-scale landscape models. 3. Investigate how CC and alternative nutrient management strategies affect water quality in the CB. 4. Assess tradeoffs between costs of Best Management Practices (BMPs) and landscape management intended to control nitrogen (N) loadings and variability of N loadings under alternative CC scenarios.

Results

Climate data was downscaled for 4 of the test bed watersheds, which are also initialized and calibrated. A new Greenhouse Gas (GHG) model to developed to predict nitrous oxide emission from agricultural systems. The model has been tested and an economic assessment model

developed to quantify the tradeoffs between water quality BMPs aand the costs needed to achieve the water quality goals. The model has been applied in selected test bed locations.

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Research climate change adaptation techniques for vegetable producers that will result in recommendations for the use of strip tillage as a climate change adaptation strategy in the US and abroad.

Not Reporting on this Outcome Measure

Outcome #9

1. Outcome Measures

Potential use of purslane to cleanup environmental chromium-6 contamination

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Chromium is a natural element that exists in several different forms. While chromium-3 is a nutrient that is essential for human well-being, hexavalent chromium, or chromium-6, is a carcinogen. Exposure to chromium-6, either through breathing or up-taking, can lead to various cancers such as lung cancer and stomach cancer. Chromium-6 is produced by industrial processes and used in wood preservation, electroplating, and textile manufacturing. The coal ash released by coal-burning power plants is also a major source of chromium-6, and more than 10 million pounds of the element are produced by electric utilities in the U.S. each year. If not treated properly, the chromium-6 that comes from all of these sources can run off and contaminate the

drinking water system. A recent report by the Environmental Working Group (EWG) found that the tap water of hundreds of millions of Americans contains chromium-6 at a considerably dangerous level. The removal of chromium-6 from contaminated sources before it runs into the drinking water system or the efficient treatment of chromium-6-contaminated water are essential approaches to protecting human beings from being exposed to chromium-6 and from the health issues that follow.

What has been done

In recent years, scientists at Virginia State University have conducted research on genetic variations in purslane that result in heavy metal accumulation. They have identified several purslane accessions that have ability to accumulate high levels chromium-6 in their shoots. Interestingly, one of purslane accessions is so unique that not only can it accumulate chromium-6 in its shoots, but its growth is actually promoted by chromium-6. The growth rate for plants treated with 200ppm chromium-6 more than doubles in comparison to the control plants receiving no chromium-6 treatment. Such phenomena would make purslane an ideal tool to be used to clean water and land contaminated with chromium-6, through using a bioremediation approach.

Results

Our research has identified a new opportunity for removal of the environmental contamination of chromium-6. This study will not only benefit human health through providing clean living environments, but it will also contribute to safe urban agriculture through providing clean lands in urban areas.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation

Outcome #10

1. Outcome Measures

Increase acreage using conservation practice on cropland

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	18

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Water quality, including that of the Chesapeake Bay, can be impaired by excess nutrients and sediment lost from agricultural lands. Conservation tillage involves the planting, growing and harvesting of crops with minimal disturbance to the soil surface through the use of minimum tillage, mulch tillage, ridge tillage, or no-till. Reduced soil disturbance and increased surface residue cover can reduce soil losses via erosion, reduce the loss of nutrient enriched sediments, increase water infiltration and nutrient adsorption, and increase soil aggregate stability. Local and regional needs assessment has identified no-tillage row crop production as a best management practice to improve soil and water quality.

What has been done

Research, education and demonstrations are conducted to illustrate the benefits of adoption and continued use of no-till systems and on how to most successfully implement these systems. Reduced and no-tillage production techniques and cropping systems based on these practices were featured in 17 meeting and conference sections in 2016. In addition, the winter meeting of the Virginia No-Till Alliance was held in Harrisonburg with over 350 attendees.

Results

In 2016, the Conservation Technology Information Center estimated that high residue, reduced tillage farming practices were used on 60.3% of cropland in Virginia. This is up from an estimated 44% in 2000 and 52% in 2005. Compared to conventional tillage, high residue, reduced tillage acres are estimated to provide a reduction of 69% less sediment, 2-14% less nitrogen, and 7-70% less phosphorus, depending on site-specific conditions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
605	Natural Resource and Environmental Economics

Outcome #11

1. Outcome Measures

Increasing the agricultural nutrient management on cropland

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Local and regional needs assessment has identified the implementation of nutrient management plans for row crop production as essential for reaching and maintaining production and environmental goals. Research, education and demonstrations are conducted to illustrate the benefits of adoption and continued use of nutrient management plans.

What has been done
All large animal feeding operations in Virginia, biosolids applicators and many farms that receive cost share money, are required to have nutrient management plans. Nutrient management plans are designed to assist landowners and operators in the management of land application of fertilizers, biosolids, animal manures, and other nutrient sources for agronomic benefits, and for the protection of the Commonwealth?s ground and surface waters.

Results
Nutrient management topics were discussed at over 25 producer meetings and 7 field days with over 1600 attendees. Field scale demonstrations and research studies were conducted as part of each of these field days. Working with the DCR two training events lasting two days each, to train stakeholders to take the certification exam were held. VCE also provided several events that offered CEU?s for several hundred planners already certified and personnel from certified farms. At these two training events a total of 37 new nutrient management planners were trained to take the certification exam. These planners and those certified in previous years wrote over 300,000 acres of nutrient management plans for permitted farms. Following nutrient management protocols results in estimated 21% and 70% reductions in N and P losses from cropland and pasture over acres with no nutrient management. In Virginia, over 1.03 million acres were managed per nutrient management criteria for a collective estimated reduction of 3.9 million and 680,000 pounds less N and P lost, respectively, from agricultural land in the state.

4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

Reducing Urban Nutrients -- Healthy Virginia Lawns

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	947

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In 2013, the Virginia General Assembly enacted legislation addressing fertilizer application such as a restriction on lawn maintenance fertilizers containing phosphorus. Since nearly 75% of Virginia is in the Chesapeake Bay Watershed it is imperative that municipalities, businesses, and consumers employ Best Management Practices (BMPs) in urban fertilization. For more than 20 years, Extension offices such as Prince William and Henrico Counties have been providing services to their residents through Extension Master Gardener (EMG) programs focused on urban nutrient management (UNM). In addition to providing UNM plans to homeowners, these programs also direct clients to adopt BMPs for lawn and landscape management. The Environmental Protection Agency has developed standards for nutrient run-off reduction for all states in the Chesapeake Bay Watershed for both agricultural land and publicly and privately managed turf. While some localities have been conducting UNM programs for more than 20 years, all of the programs existed and operated locally with no uniform guidelines, reporting, or support.

What has been done
In order to address urban nutrient management statewide, a partnership was forged between VCE and the Virginia Department of Conservation and Recreation (DCR). The overall goals of this partnership are to increase the number of Extension units offering UNM programs to their residents and to ultimately reduce the amount of nitrogen and phosphorus entering the Chesapeake Bay. DCR provided financial support to our program for the third year in a row. We held an in-service training in April, the Advanced EMG Water Steward Manual was updated and data was aggregated statewide from all of the individual HVL programs. The initiative concept was shared both statewide and nationally through two conferences. The HVL program addresses the homeowner component of nutrient management. To address the commercial side of nutrient management, the Fertilizer Applicator Certification Training (FACT) program was created. Fertilizer Applicator Certification Training is a cooperative effort of Virginia Cooperative Extension, Virginia Department of Agriculture and Consumer Services, and the Virginia Department of

Conservation and Recreation. The training consists of 10 online, self-paced modules, which cover the knowledge areas in which one must be proficient in order to become a Certified Fertilizer Applicator (CFA) in Virginia (http://ext.vt.edu/agriculture/commercial-horticulture/greenhouse-nursery/fertilizer-application.html). An agent in-service training covered technical aspects of residential lawn management and urban nutrient management. A total of 30 Extension agents, local Master Gardener Coordinators, and interested EMG volunteers participated. Partners from the Department of Conservation and Recreation presented information on relevant aspects of the UNM program.

Results

Statewide 10 Extension Units reported data against Healthy Virginia Lawn (HVL) activity. In total, more than 168 volunteers reported more than 3,714 volunteer hours, served more than 1,146 clients, wrote 947 urban nutrient management (UNM) plans for nearly 300 acres of residential lawns. The formation of the statewide HVL initiative has brought together existing resources and encourages the formation of new UNM programs leading to even more significant impacts to the EPA standards for the Chesapeake Bay. Additional turf acreage was reported to the EPA under nutrient management. By including golf courses and athletic fields with residential turf, more than 46,000 acres of turf were reported to the EPA as being under certified nutrient management plans. When considering the number of acres reported by Certified Fertilizer Applicators (CFA), more than 116,000 acres were reported as managed under a fertilizer program. In 2016, 162 CFA?s were trained and completed online training modules. Additionally in 2016, 600 CFA?s and trained technicians were recertified. Certified urban nutrient management planners are essential to nutrient reductions in the Chesapeake Bay Watershed and for acreage to count toward our statewide goals for reporting to the EPA, plans must be certified by a planner. In 2016, 18 new urban nutrient management planners were certified bringing the total of official, certified urban nutrient management planners in Virginia up to 174 individuals.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
605	Natural Resource and Environmental Economics

Outcome #13

1. Outcome Measures

Forty Years of Fall Forestry & Wildlife Field Tours Increase Implementation of Sustainable Woodland Management Practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	216

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Virginia, we rely on private families to keep over 10 million acres of woodlands healthy and productive. Which, faced with the challenges of invasive species invasions, insects and diseases, severe weather, ever-changing markets, and rapid turnover of owners, is no small task. But managing these challenges is essential to increase our woodlands? contribution to the Virginia economy ($17 billion annually) and to provide ecosystem services (e.g., such as clean water and wildlife habitat, valued at $16 billion annually).

While most owners want to keep their woodlands healthy and productive, many are not certain how to accomplish these things. Both this uncertainty and the overwhelming amount of readily available information may lead to inaction. But we know from research 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.

What has been done
In 1976, there were few Extension forest management specialists in Virginia. So, when faculty from Virginia Tech Department of Forestry?s Management-Economics Section asked, ?Why not take non-industrial private landowners into the woods to show them demonstrations of sustainable forest management??, everyone liked the idea, but few had the time to pursue it. With the assistance of the Virginia Forestry Association (VFA) and the Virginia Department of Forestry (VDOF), VCE shaped the tangible Extension program for landowners? the Forestry & Wildlife Field Tours. Forty years later, this program, (now under VFLEP) is the longest running program of its type in Virginia. To date, VCE has offered 216 tours for well over 5,600 participants.

The original goal of the Tours has remained the same: demonstrate to non-industrial private landowner?s active forest and wildlife management practices that help them meet a diverse array of goals. These include increasing timber income and investing in management practices that increase productivity and sustainability. Over the years, as markets and interests have evolved, these goals have expanded to include topics such as growing Christmas trees, producing non-timber forest products, re-establishing and improving wildlife habitat, controlling exotic invasive species, cost-share programs, creating recreational opportunities, and implementing agroforestry practices. In 2016, we used an exit survey to assess what, if any, short-term impacts these tours were having on the attitudes of woodland owners and their willingness to implement sustainable forest management practices. Participants in the Fall Forestry & Wildlife Field Tours tend to own larger acreages for longer periods of time than participants in some of VFLEP?s other programs (e.g., the Beginning Landowner Weekend Retreats). The 2016 participants owned over 25,000 acres of forestland for an average of 23 years. While the majority of them had purchased their land (63%), over 31% had inherited it.

Results

In the short-term, the Field Tours do have a strong effect on the attitudes of forest landowners. There was a 29% increase in agreement that active management practices are sustainable and beneficial to woodland health, a 27% increase in agreement that active woodland management practices can benefit wildlife, and a 36% increase in agreement that working with a natural resource professional helps landowners meet their woodland management goals. In addition to changing attitudes, the Field Tours inspire attendees to implement sustainable woodland management practices. Of the attendees who had not already done so, 58% planned on creating a list of ownership goals (the first step towards a written management plan), 69% planned on meeting with a natural resource professional (the second step towards a written management plan), and 47% planned to obtain a written wildlife/woodland management plan. Having a written management plan not only allows landowners to qualify for numerous state and federal cost share programs, it is also an entry point for landowners who want to certify their woodland management. 70% of the participants in the Field Tours do plan on implementing at least one sustainable woodland management practice. These practices included reducing invasive plants, timber stand improvement, creating a silvopasture system, sharing the information from the tour with others, planting for monarch butterflies, and creating wildlife food plots.

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land
605	Natural Resource and Environmental Economics

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: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	43.2	2.0	0.0	0.0
Actual Paid	44.6	2.0	0.0	0.0
Actual Volunteer	1831.0	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**
420408	466327	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
543779	466327	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1177781	0	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

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?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	29232	49233	28868	996

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	1	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of unregulated child care providers enrolled.
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of parenting education sessions conducted.
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Number of educational sessions offered to promote efficient small business practices
  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	Parenting Education - Increase the percentage of parenting education participants that indicate increased knowledge of effective parenting practices.
2	Identify and educate unregulated family child care providers.
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.
5	Increase the capacity of entrepreneurs to identify, develop, and sustain business enterprises.
6	Increase the number of agents who are integrating stress reduction education into their everyday Extension programming.
7	Building Capacity for Intergenerational Program to Support Young Children and Older Adults
8	Educational support for grandparents raising grandchildren in Virginia
9	Securing the financial health of at-risk military veterans
10	CashCourse program for Virginia State University students

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
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Many criminals return to prison because they were not rehabilitated while in jail. Inmates are released after serving time without learning social skills or being educated; therefore, they have a hard time finding a job or a place to live and often return to a life of crime rather than integrating into society. Without adequate preparation and support for life after prison or jail, the chances are great that inmates with drug use problems will return to their former situations and lifestyles. Two-thirds of all parolees are rearrested within 3 years ? most within the first 6 months after release.

What has been done
Through the "Build a Bigger Bucket? program inmates learn to identify their spending leaks, create a workable budget, battle debt, and create a plan that may eventually lead to financial freedom. What started as a financial literacy program within the Blue Ridge Jail Authority in 2013 has morphed into a larger integrated programming opportunity. After my first encounter with the inmates, I realized that the majority of them really wanted to reenter society after release with the ability to not only secure some financial stability but also reconnect with their families. Many of the inmates have lost years from their children?s lives and my financial literacy program branched off into an opportunity to assist with the father?s ability gain trust from their children and re-establish bonds. Recognizing that for many of the inmates, the services that were offered during the re-entry assistance program stopped after they were released, last year a new component was added. In hopes that the inmates would feel that they had a lifeline through Extension that could support them not only with their financial education needs, but also with their parenting education and nutrition needs they received a voucher upon graduation from the re-entry program. The voucher gives them access to a Virginia Cooperative Extension drawstring backpack, financial literacy workbooks, parenting resources, and a couple children?s books to help them reconnect with their children.

Results

When this program began in 2013 I worked with five inmates over the course of the year. This past year I served 50 inmates. Over the past four years, I have worked with 148 inmates to gain financial literacy. Upon completion of the program, all 148 had completed a working budget and could identify at least three spending leaks that they believe they would be able to prevent once being released. The inmates who stated that they would be returning to father their young children were able to identify one strategy to reconnect with their child. To date nine vouchers have been redeemed and three inmates have contacted the office for additional resources and information. Statistics state that close to sixty-seven percent of inmates return to jail with in the first three years following their release. Data was collected this year for the re-entry program reporting that only 2 inmates that participated in the program over the past four years were re-arrested following their release bringing the success rate for the re-entry program to 98.6%.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Identify and educate unregulated family child care providers.

Not Reporting on this Outcome Measure

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

While the median household income in Virginia ($64,729) is higher than the median U.S household income ($53,482) (Census.gov), Virginians also take on more debt than the typical U.S. household. For example, there are only seven states with higher average household credit card balances than Virginia (bankrate.com). At the national level, the 2015 Consumer Financial Literacy Survey prepared by Harris Poll 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. Finally, while a majority of adults use a savings account, much fewer use investment vehicles such as a 401(k) or IRA. The well-being of Virginians depends on individual and family financial capacity. Financial capacity will enable individuals to make informed choices, sound decisions, and avoid financial pitfalls, as well as obtain knowledge of strategies to implement during times of financial crisis. The process of developing financial capacities will provide individuals the appropriate tools to understand and apply financial products, services, and concepts in an effort to improve their financial situation.

What has been done

FCS Agents collaborated with Master Financial Education Volunteers, Extension Leadership Council members and community volunteers to deliver financial literacy workshops, and one-on-one counseling sessions to Virginia residents. FCS Agents collaborated with the 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. In 2016, 4659 adults attended one of 623 sessions led by 17 FCS Extension agents.

Results

There was a dramatic increase in planned behavior based on surveys taken prior to the adult financial literacy programs and after them: A 196% increase in those planning on writing short term financial goals. A 151% increase in those planning on writing a spending and savings plan. A 188% increase in those planning on paying themselves first for savings. A 201% increase in those planning on having an emergency fund. A 152% increase in those planning on paying down debts. A 223% increase in those planning on reviewing their credit report annually.

A Personal Story: Clients: "It finally clicked, I've made changes and have paid my $600 debt and started a savings account." One woman reported that she has eliminated $1,500 of her credit card debt. A financial counseling client who had previously saved no money began to save money after meeting with me and she now has $400 saved in a savings account.

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
2016	0

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 believe their parents do not spend enough time talking to them about personal finances. Meanwhile, America Saves (2015) state that while youth are aware that it is important to save, they don't know how to save. Seemingly, youth are eager for financial education, but lack the resources to achieve financial literacy. For many, attending college will be one of the earliest major financial decisions one makes. This year, Junior Achievement/ The Allstate Foundation released a report stating only 50% of adults between the age of 18 and 29 were â??very confident' in their ability to pay off their student loan. It is quite possible that this lack of confidence stems from an underlying misunderstanding of personal finance topics. While Virginia was one of 35 states requiring implementation of personal finance state standards and one of 17 states requiring students to take a personal finance course, it is NOT one of the 6 states that require personal finance student testing (councilforeconed.org) as of 2014. The Program for International Student Assessment (PISA) reported that of 15 year old students from 13 countries, the United States scored less than average. All of this is evidence that there is a need for more youth financial education.

What has been done
Virginia Cooperative Extension uses several approaches and programs to educate youth and increase the financial capacity of Virginia's youth. The program's goal is to educate students about sound money management skills and the financial planning process and to help them begin to develop positive behaviors that are necessary to attain financial maturity and achieve a secure future. VCE offered Reality Store simulations, Kids Marketplace simulations, and Real Money Real World simulations. Each of these programs offers hands-on learning in an environment that

correlates to Standards of Learning and educational mandates. In 2016, 10 FCS and 9 4H agents conducted a total of 58 Kids Marketplace simulations with an audience of 2924 children. This represents a 142% increase in number of simulations and a 51% increase in the number of children who participated relative to 2015.

Results

Of the youth particpants surveyed, 89% learned more about using money, 71% learned the importance of giving something up in the short run for something in the future, 88% reported that the program gave them new ideas on how to handle money in the future, and 82% plan to talk to their parents about money. 73 Agents conducted a total of 114 Reality Store programs in 2016 with an audience of 11,330 children, representing a staggering 43% increase from 2015. Of those surveyed, 94% stated the program increased awareness of making smart financial decisions and 95% reported that having insurance and a savings account would help plan for emergencies. 7 Agents conducted 7 Real Money, Real World programs in 2016 with an audience of 1533 children, an increase of 117% from 2015. Of those surveyed, 90% indicated they will think through how spending impacts other opportunities and choices. Combined, 15,787 Virginia youth were reached by Extension Financial education in 2016, an increase from 10,573 in 2015, 9046 in 2014, and 7681 in 2013. 2,381 volunteers contributed 11,346 hours equating to $296,017 ($26.09/hr). This compares to 1015 volunteers and 5500 hours in 2015, increases of 135% and 106% respectively.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #5

1. Outcome Measures

Increase the capacity of entrepreneurs to identify, develop, and sustain business enterprises.

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Increase the number of agents who are integrating stress reduction education into their everyday Extension programming.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In the fall of 2014, extension agents across Virginia were asked to consider the social and human needs of their communities. The number one need indicated for all districts was the same: Domestic issues (65%). Domestic issues had been defined as families finding jobs and experiencing the stressors of a tough economy which leads to struggles with relationships and disconnects between parents and children. When asked what types of resources that agents need in order to address these issues, the most popular response was that they need a brief (1-3 minute) video to incorporate on these human development topics within their other programs (42%). This was followed by their need for tools including teaching modules (40%), social media messages (33%), and fact sheets 31%. Agents were asked what types of human development content would be helpful to understand to supplement and strengthen their outreach. The primary response (46%) indicated that learning more about the dynamics of stress including coping mechanisms was a priority. The second area (41%) was that of relationship building in the areas of family, intergenerational, and community, and business.

What has been done
Based on these recommendations, the team developed multi-media program support materials that can be integrated into any extension program including social media messages, brief video segments, fact sheets and webinar trainings for agents. In the summer of 2015, five brief video segments were designed, scripted, edited, and published. This â??Beating Stress' video series can be used by agents and clients to learn how to identify, understand, and shrink their stress in the areas of daily living, family and business, relations, financial, and wellness. A video viewing guide that includes coping mechanism for each identified stress module was also created. Additional teaching publications were added and through a webinar titled â??Stress Solutions', Human Development Program Team members presented the resources to FCS, 4-H, and ANR agents across the state who are willing to embed components of the stress curriculum into some of their existing programs.

In 2016, the Human Development Team continued to encourage agents from all program areas to either embed stress reduction strategies into their regular programing or conduct a program that engaged participants to learn more about life stressors and how to react with the least amount of negative impact. Sonya Furgurson and Karen Tanner conducted workshops to share strategies on how this could be accomplished and an award incentive was initiated to reward agents for embedding stress reduction strategies into their programming. An action plan goal of 50 embedded or individual programs was established.

Results
In the fall of 2015, four FCS programs were completed with components of stress embedded into them. In addition, one full "Stress Solutions" workshop was held for a group of forty six middle school teachers. The evaluations from the workshop revealed that participants were able to identify at least two stressors and the effects that these stressors have on their relationships and physical health. In addition, they were able to give a list of at least 3 stress solutions that they will try in order to reduce their negative response.

Using a qualtrics survey, the Human Development Team asked agents from all program areas to report how many times they embedded or held individual programs on stress reduction in 2016. Twenty-two agents responded. Of these agents13 reported that they facilitated programs that involved stress reduction strategies. Sixty-eight programs were held that included elements of stress reduction and thirty-one full stress reduction programs were completed. The total embedded or individual stress reduction programs held by agents in 2016 was ninety-nine, nearly twice as many as the action plan goal.

The Human Development Program Team members will continue to support agents as they continue to find ways to incorporate stress reduction strategies into their regular programing in 2017.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Building Capacity for Intergenerational Program to Support Young Children and Older Adults

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to Virginia Voices for Children, over two-thirds of parents of young children are in the workforce, requiring many of those children to utilize paid child care services. The quality of early care matters, and brain researchers, economists and business leaders all agree ? investments in early care and education provide the biggest return on investment. Scientists have discovered how early experiences shape the architecture of the brain before a child turns 5 years old. Economists have found a long-term return on investment of $7 for every $1 invested for children who participate in high quality early care and education. Thus, business leaders have stepped up to the plate to advocate for their future workforce (Virginia Voices for Children). Clearly, parents,

caregivers, professionals and schools all have a role to play in shaping our children?s school readiness. At the same time, adult caregiving needs are on the rise, and ?we expect Virginia?s population of older adults to double by 2030,? according to Virginia Department of Aging and Rehabilitative Services Commissioner Jim Rothrock. With the population of older adults growing, there could be an opportunity to engage both our young children and older adults in efforts to serve as resources to one another. Research shows that when the generations come together everyone benefits, children and youth, older adults and the community at large. Children are exposed to their elders? traditions and wisdom. And because of these interactions, adults are able to expand their social networks and stay physically active, which betters their health outcomes. Communities benefit when all are engaged and feel included. Intergenerational (IG) programs help to dispel age-related myths and stereotypes. They can also address societal concerns such as literacy, environmental issues, health, and crime prevention (Generations United, 2016). In one study comparing children who attended an IG childcare to children who did not, evidence revealed benefits of enhanced self-regulation, willingness to help, empathy for elders, and a more positive attitude about elders. Benefits to older adults identified across multiple studies included increased generational empathy, engagement, and positive affect. Even elders with dementia can effectively nurture a child if appropriate curricula are used (Jarrott, 2016) As more families rely on home and community-based services to help meet the care needs of young and old relatives, opportunities arise to meet family caregivers? needs, achieve the benefits described above, and, potentially, achieve cost-savings. In a 2010 survey by Jarrott, shared site care programs with the highest level of integrated programming demonstrated significantly lower personnel and facility expenses. At a time when community care providers are asked to do more with less, as families seek assistance from these services, and as a growing number of vital older adults enter retirement, society has the chance to achieve synergy by introducing and sustaining evidence-based IG programming.

What has been done

To identify the potential of IG strategies to address these needs in Virginia, Project TRIP (Transforming Relationships through Intergenerational Programs) was developed by a Virginia Tech researcher and an Extension specialist and funded by CYFAR (Children, Youth, and Families at Risk) from August 2011 - August 2015 as the Sustainable Community Project of Virginia (Award: 2011-41520-30639). Through partnerships with other organizations, CYFAR develops and delivers educational programs that equip youth who are at risk for not meeting basic human needs with the skills they need to lead positive, productive, contributing lives. The long-term aim of Project TRIP is to develop an intergenerational (IG) model and test its ability to be replicated to support socioemotional development and well-being of at-risk children ages 2-5 and older adults through high context (daily) programming and community building. To begin, Project TRIP partnered with six childcare and pre-school programs in Virginia, addressing the primary goals to: ? Improve staff knowledge of and attitudes towards evidence-based IG practices and ? Increase implementation of these best practices. Through Project TRIP preschoolers had weekly opportunities to join their older adult partners for programming designed to support positive intergenerational contact. Programming was intended to support development of life skills while the children build trusting relationships with older adults through regular interaction with a consistent group of elders. Activities incorporated skills, including self-expression, decision-making, and sharing of cultural traditions, preferences, and social history. Programming may be formal with developmental and relational objectives, such as building a bird feeder where child and elder pairs work together on the activity, or it may be spontaneous, such as when children learn a new poem and visit the elders to share the poem. Participation was voluntary for all children and adults; programming occurred between one and three times a week and increased with the sustainability of the program. Project TRIP also sought to develop staff expertise as well through community partnerships, grant opportunities, and frequent booster sessions to increase knowledge of successful tools and techniques for intergenerational programming and

sustainability.

Results

Site staff at the six sites planned, implemented, and evaluated 512 intergenerational activities. Activities were implemented at a given site 1-6 times per week and usually lasted about 30 minutes. On average, 6 children and 7 elders joined each intergenerational activity. Individuals joined an average of approximately 5 hours of programming, ranging from less than 1 hour to 65 hours of intergenerational contact. Parents completed surveys describing their child's comfort interacting with older adults, and 75 percent reported that their children are somewhat or much more comfortable interacting with elders after participating in IG programming at one of the centers. Moreover, at another center, 82.4 percent of parents reported their children were either somewhat or much more satisfied coming to the center itself after participating in IG programming. Some parents offered additional anecdotes indicating that children felt comfortable talking to elders in community settings after joining TRIP programming. Thus, the gain in children?s socio-emotional development was noted. Moreover, there was some anecdotal evidence provided regarding the older adults, as well. One staff member reported: ?IG is good for our seniors, too. Our seniors worry less about depression or anxiety because they are able to keep being social. Even though it?s with a little person, it?s somebody. A lot of seniors don?t get that. I feel like that?s helping to keep them active.? Building skills and partnerships among staff members contributes to sustainability of IG programming as facilitators build their confidence and network connections to optimize their work. To assess the improvement in staff attitudes and knowledge, as well as increased use of best practices, qualitative interviews were conducted with over 30 staff members and administrators across the 5-year project. Results indicated that staff comprehension and use of best practices increased over time. Observed behavioral responses through videos of interactions between the older adults and children became more interactive and less passive than were observed at the beginning of the project.

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Educational support for grandparents raising grandchildren in Virginia

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual

2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is a new reality in the 21st Century ? that is grandparents raising grandchildren. Virginia has nearly 180,000 children under the age of 18 residing with a grandparent or relative as the primary caretaker/parent, with 16 % of these grandparents living at 100% of the poverty level. This is often because of parental situations involving incarceration, joblessness, drug involvement, child abandonment, and child abuse and neglect. This new situation of grandparents raising grandchildren comes with many worries, disappointments, and hardships for the family. Some grandparents have to delay retirement and work long past what was expected to be a normal retirement age. In addition to financial challenges, worries about their own aging and medical issues threaten their ability to provide a stable and nurturing environment for the grandchildren. Grandparents are often faced with legal issues, questions, and concerns about parental rights, support, and custody or legitimate interest. There is a need for an educational support network.

What has been done

To address the issue, a Grandparents Raising Grandchildren (GRC) Support Group was developed to provide an opportunity for grandparents who are in the primary parenting role to identify information and supports that they need and want, empower their resourcefulness, and to share and support each other?s challenges and successes in the rearing, understanding, nurturance and management of grandchildren. Grandparent participants were recruited in collaboration with the Crater District Area Agency on Aging Foster Grandparent Program and Petersburg Public Schools Early Childhood Education Center at Westview Elementary School. The group meets once monthly on the 3rd Tuesday of each month during the convening months of the public school year (September ? June). The GRG Support Group celebrated victories and successes without judgment of the value to the other; and engaged to support, and advise participants to study and accept resolution of their issue. A GRC facilitator conducted home visitations, consultations with public schools and support agencies, and counseling referrals were provided to families, thereby alleviating and preventing child and family risks and dramatically cutting medical and legal costs for child abuse and neglect.

Results

- 40 consultations and home visitations
- 28 Grandparents raising grandchildren provided educational support and engagement
- 28 grandparent participants practiced skills in assertive, and effective communication
- 28 grandparent participants practiced skills in positive behavior management
- A minimum of 28 grandchildren benefited from their grandparent?s improved parenting skills

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Securing the financial health of at-risk military veterans

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Many US military veterans lack effective financial management skills. Heavy reliance on military pay structures that cover housing, food, and healthcare during their active duty period have left many soldiers unprepared for the harsh financial realities of leaving the military. Common sense financial practices such as saving, and debt management must be taught to military veterans. Currently 1.4 million US military veterans are financially insecure and living payday to payday. Remedying this dire financial situation requires educational support for US military veterans. Currently, there is a lack of financial management educational programs in Virginia to assist US military veterans in overcoming financial challenges.

What has been done
To address the lack of financial programs in Virginia to assist US military veteran, the following activities were conducted:
- Existing Master Financial Education Volunteer (MFEV) Program curriculum was revised and updated to address financial issues unique to US military veterans. Three new sections of the MFEV materials were added: 1) Principles of Adult Education, 2) Individual Learning Styles, and 3) Basic Financial Coaching Instruction.
- Four VCE Agents and 27 VCE volunteers completed the 20 hour trained on the revised MFEV program content.
- Five MFEV programs were conducted in Virginia

Results
- 27 MFEV trained volunteers are able and ready to assist VCE Agents in their financial management educational programs
- 110 US military veterans increased their understanding and practice of debt management
- 110 US military veterans created personal spending plans

- 110 US military veterans created personal savings plans
- A new financial coaching segment was added that provided three to six months of free coaching if desired by the veterans.
- 33 financially at-risk veterans believed the training they received enabled them to reduce their debt burden a minimum of $5,000 by December 2017
- 27 financially at-risk veterans believed the training they received will enable them to contribute a minimum of $100 into a savings account each month, thereby increasing their personal savings a minimum of $1,200 per year
- 33 financially at-risk veterans believed the training they received will enable them to improve strained family relationships due to lack of financial management skills

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #10

1. Outcome Measures

CashCourse program for Virginia State University students

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to Institute for College Access & Success (2016), 92% of VSU graduates have debt when they graduate and the average debt of a VSU Class of 2015 graduate amounted to $28,250 per student. With uncertain employment after graduation, the importance of teaching financial management skills to VSU students is needed in order to train students to manage debt and create a habit of saving to prevent long-term negative financial results for VSU graduates. In 2015, the VSU CE Financial Management Specialist identified a lack of available financial programs to educate VSU students on debt management and budget planning.

What has been done

To address the lack of available financial programs to educate the Virginia State University Students (VSU) the following activities were conducted:

- The CashCourse Program was enhanced on the University website for use by all VSU students
- A contest was created and implemented to introduce the CashCourse to the VSU students. Three prizes were awarded to students who used the CashCourse Program.
- The CashCourse Program was introduced into three classrooms within the College of Agriculture in 2016

Results

- 64 VSU students applied their skills learned to create a personal spending plan and reduced their monthly spending expenditures a minimum of 10% or more, resulting in a minimum monthly spending reduction of $50 or more per student ($600 less spent annually), through a combination of financial management practices acquired as a result of participating in the CashCourse program, such as 1) Reducing impulse purchases, 2) Use of VSU discounts they were not aware of, 3) Use of online coupons, and 4) Employing delayed gratification techniques, resulting in a class annual total spending reduction of $38,400 ($600 x 64 participants).
- 58 VSU students created a personal savings plan that they did not have prior to the classes and were able to commit to saving a minimum of $25 per month, or $300 per year, resulting in a class annual total savings of $17,400 ($300 x 58 participants).

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.)
- Other (State legislation charging another agency to serve unlicensed child care providers)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

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: 2016	Extension		Research	
	1862	1890	1862	1890
Plan	81.0	2.0	0.0	0.0
Actual Paid	97.0	2.5	0.0	0.0
Actual Volunteer	15030.0	65.0	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**
2745022	317156	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
3550555	317156	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
7690214	0	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

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2016	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	162913	531787	761989	589035

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

Patent Applications Submitted

Year:	2016
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2016	Extension	Research	Total
Actual	5	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Total number of educational presentations for VCE's targeted audiences with a focus on positive youth development.

Year	Actual
2016	1691

Output #2

Output Measure

- Total number of peer reviewed publications focused on positive youth development.

Year	Actual
2016	8

Output #3

Output Measure

- Total number of 4-H youth participants enrolled in all delivery modes.

Year	Actual
2016	240812

Output #4

Output Measure

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

Year	Actual
2016	103350

Output #5

Output Measure

- Number of youth engaged in Citizenship.

Year	Actual
2016	100042

Output #6

Output Measure

- Number of youth engaged in Healthy Lifestyles.

Year	Actual
2016	111171

Output #7

Output Measure

- Total number of adults volunteers.

Year	Actual
2016	12049

Output #8

Output Measure

- Total number of non-peer reviewed publications focused on positive youth development.

Year	Actual
2016	0

Output #9

Output Measure

- Total number of youth volunteers.

Year	Actual
2016	3470

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.
14	Growing Resilient Youth through 4-H Mentoring
15	4-H Military Partnership: Making a Difference for Youth on Virginia Military Installations
16	Connecting Geographically Dispersed Military Youth to 4-H

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
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

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. Current studies indicate 56% of youth ages 8-12 have a cellphone. (National Consumers League) According to the Pew Research Center, 86% of Americans currently use the internet and Facebook usage is on the rise. (Pew Research Center - http://www.pewinternet.org/2016/11/11/social-media-update-2016/) With social media and texting taking a bigger role in how our youth choose to communicate, camping programs allow youth the opportunity to put away technology and connect with each other through face-to-face interactions.

What has been done
Communication is an essential skill. Youth attending short term residential camping programs are afforded many opportunities to strengthen and develop their communication skills. It is important for youth to be able to talk to their peers and make new friends. Youth should also feel comfortable talking with teen counselors and adults who are in supervisory roles at camp. By attending these camping programs, youth develop confidence in sharing their opinions through developing activities, preparing team challenges and living in a group environment.

Results
Post camp surveys from the 2016 Junior Camping Program indicate that campers ages 9-13 report increasing their ability and comfort in communicating with adults and peers as a result of attending 4-H camp. During camp, 96% of youth felt they could talk to teens and adults. After attending camp, surveys indicated a 14% increase in youth feeling comfortable speaking up when witnessing bullying and a 2% increase in youth expressing their opinions with others. These survey results support the hypothesis that 4-H Camp does indeed enhance and increase

confidence in communicating in youth ages 9-13 with adults, teens and their peers.

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.

Not Reporting on this Outcome Measure

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.

Not Reporting on this Outcome Measure

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.

Not Reporting on this Outcome Measure

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.

Not Reporting on this Outcome Measure

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.

Not Reporting on this Outcome Measure

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
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
About 40% of all edible food is wasted in the United States. This amounts to 37 million tons of food ending up in landfills each year, the second largest waste category, and $161.1 billion in waste. Food waste prevention strategies must be utilized to reduce the amount of food that is discarded. Therefore, it is important to understand what contributes to food waste and which resources can be effectively utilized to reach different populations. Related to youth, most food waste studies and efforts to reduce food waste have been directed at schools, not in other locations. Summer camps foster an environment of positive youth development and base lessons on the experimental learning method, a method that is not often used in school and home settings. For youth, experiential-based education can be an effective method to convey food waste information.

What has been done
To understand the amount of waste that youth generate, and to measure the potential of reducing food waste, food waste was measured before and after a program at the northern 4-H camp.

Four weeks of camp were chosen for the study with the number of participants ranging from 150 to 305 youth. Waste from three meals (breakfast, lunch, and dinner) within a 24-hour cycle before and after the food waste awareness program was collected and weighed. At the end of each meal, excess food produced by the kitchen was weighed and placed in the production waste category and leftover food from the plate of each youth was placed in the consumer waste category. The production waste category included leftover food in the serving bowls that the kids did not serve and food intended for seconds that were not served. Consumer waste consisted of food that the children served themselves but did not eat. Waste was measured the day before and the day after the educational program was conducted. The awareness program consisted of four activities centered around food waste. One activity was a math activity called ?whole earth calculator? which allowed the children to calculate how many meals could have been made out of the wasted food. The second activity called ?weigh the waste? allowed campers to use canned food to visualize how much food was wasted based on the weight of the wasted food. The third activity called ?leftover challenge? allowed campers to create meals out of foods that were served the day before. The fourth activity called ?text talks? consisted of questions based around food waste. These questions were written on poster paper so that children could read each other?s answers. Food waste surveys were also distributed and children provided input on certain food items that were wasted the most. These activities were all based on the amount of food that the specific camp week wasted, so numbers varied each week as different camp weeks wasted different amounts of food. These activities were implemented in the afternoon program of one of the camp days.

Results

In total, after all four weeks, 76.5 pounds of consumer food waste was wasted before the food waste awareness program and 57.3 pounds was wasted after the program, a difference of 19.2 pounds. This averaged to approximately 2.7 ounces per child. Dinner was the most wasted meal, with a total of 36.3 pounds before the intervention and 28.3 pounds after the program. Lunch waste resulted in 28.6 pounds before and 20.62 pounds after the awareness program. Breakfast had the least waste with 11.5 pounds before and 8.4 pounds after the program. Production waste at the beginning of the data collection period was high, with 149.3 pounds before. After the awareness program, there was a reduction of 26.0 pounds to a total of 123.3 pounds. The results from this project indicate that consumer waste was relatively low, but was still reduced after an awareness program. The results also show that production waste was higher than consumer waste, offering opportunities for changes to food production processes. Anecdotal feedback was that the campers liked the program. Campers actively participated in each activity and gave genuine answers and to the ?text talk? questions. The educational program could be utilized in other 4-H camps and settings.

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.

   Not Reporting on this Outcome Measure

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.

   Not Reporting on this Outcome Measure

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
   - 1890 Extension

3a. **Outcome Type:**

   Change in Action Outcome Measure

3b. **Quantitative Outcome**

Year	Actual

2016 0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Developing leadership skills in youth who serve as teen leaders in the 4-H camping program has long since been a priority for Virginia 4-H. We see the evidence of these skills exemplified in our alumni through their professional roles and involvement in their communities. In qualitative evaluation, both youth and parents value the hands on opportunities and trainings we provide, yet we have not evaluated exactly what skills are being gained and their significance outside the camping realm. The skill set necessary for successful leadership in our camping programs align with 4-H General Common Measures for effective communication, making positive choices, and building connections with other youth and adults.

The Positive Youth Development Program Team reviewed local situation analysis reports from across Virginia to determine recurring priority needs for programming and concluded that leadership development, particularly related to career preparation and workforce preparedness, was a prevalent theme. Teens need programs that better prepare them for joining the workforce by helping them develop better critical thinking, problem-solving, and other leadership skills.

In the article, "Leaders at All Levels: Close the Gap between Hype and Readiness" (Deloitte University Press, March 7, 2014), the authors state that ?leadership remains the No. 1 talent issue facing organizations around the world,?....."Companies face new leadership challenges, including developing Millennials and multiple generations of leaders, meeting the demand for leaders with global fluency and flexibility, building the ability to innovate and inspire others to perform, and acquiring new levels of understanding of rapidly changing technologies and new disciplines and fields.?

What has been done

A survey was used to examine the connections between leadership opportunities in the 4-H Camping program and their carry over outside of the camping arena. Assessing the extent to which the experience as a 4-H camp teen counselor has helped in the development of leadership skills as they relate to future academic and career success is our goal. Surveys were conducted to measure the behavior change of teen leaders. During the 2016 Camping Program, 983 teens participated in the electronic survey.

Results

The The survey found that 72% of respondents indicated that due to their camp counselor experience at camp they always use these skills when working with a group: setting goals, taking responsibility, resisting social pressures, listening, having the confidence to speak up, and encouraging team work during and after the camp program. Over 87% of respondents reported a moderate to significant change in their behavior due to experience as a teen counselor in areas of self-esteem, problem solving, working as a team, and speaking in front of groups.

Examples of what teens shared on how they will use the experience of being a teen leader in their future:
?I will use my experiences as a teen counselor to help develop youth in my community.
?I will apply all of my skills in the work place, college, and with people.
?I gained a lot of confidence through the years and I believe I will continue to be confident in whatever I pursue.

?Being a teen has made me want to be a teacher so I will use my skills then.
?I will use this experience and help with leadership problem solving and interpersonal relationships.
?I will use my experiences that I made here in camp with school, leading groups/projects. Public speaking, compassion and fun, all these things can help me in many areas of my life. (thank you)

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.

Not Reporting on this Outcome Measure

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.

Not Reporting on this Outcome Measure

Outcome #14

1. Outcome Measures

Growing Resilient Youth through 4-H Mentoring

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual

2016 0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Relevance

Research shows that 1 in 3 young people will grow up without a mentor or in a relationship with a meaningful adult who cares about them. Through being a consistent presence in a young person?s life, mentors can offer advice, share life experiences, and help the young person navigate challenges. Youth with a mentor that they meet regularly with are less likely to skip school, less likely to start drinking and using illegal drugs, and are more likely to enroll in college than youth who did not have a mentor (The Mentoring Effect, 2014). Virginia 4-H is positioned to help fill this gap through connecting youth with a caring adult.

What has been done

Virginia 4-H secured grant funding to provide mentoring to 240 youth in Amelia, Cumberland, Grayson, and Henry Counties and the cities of Danville and Martinsville in 2016. These funds were provided by a National 4-H Grant offered through the Office of Juvenile Justice and Delinquency Prevention (OJJDP). Virginia chose to replicate the Youth and Families with Promise (YFP) model developed by Utah State University 4-H. The YFP program has an established record for positive outcomes. Family events, mentoring relationships, and 4-H activities increase social engagement, school achievement, family communications, and reduce truancy and social isolation. Program participants are at-risk 10-14 years old who show below average school performance, poor social skills, and/or weak family bonds. The youth are referred to the program by their schools. Participants in the program commit to 12 months of involvement. The program design requires participants to have weekly mentoring, at least six hours per year in 4-H club meetings and activities, at least one community service project, and six family night out programs. Program mentors are recruited, trained, matched with youth, and monitored by the 4-H Extension Agents and Mentor Educators in the mentor site locations. Youth participants completed the 4-H Common Measures survey to collect outcome data from the program.

Results

Virginia 4-H was awarded $231,840 to provide the 4-H YFP program. The total number of participants included 240 youth ages 10-14. Participants were invited to complete the 4-H Common Measures survey. 50% of the participants completed the online survey. Youth were asked to respond to a series of questions that gauged their improvement in decision making, working with others, solving problems, using technology, knowing that they have an adult that they can go to that cares about them. Highlights of the survey showed that as a result of participating in the YFP program:

83% strongly agreed that they are comfortable making their own decisions
92% strongly agreed that they can change their plan when they need to
92% strongly agreed that they are comfortable sharing their thoughts and feelings with others
97% strongly agreed that they know who they can go to if they need help with a problem
99% strongly agreed that they can work successfully with adults
99% strongly agreed that they helped with a project that made a difference in their community
98% strongly agreed that they are someone who wants to help others

Funding for the program has been continued for 2017.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #15

1. Outcome Measures

4-H Military Partnership: Making a Difference for Youth on Virginia Military Installations

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia is in the top three states with the highest number of military installations. Therefore, maintaining each link in the structure of the Virginia 4-H military program is critical. In Virginia, 4-H clubs have been established on Army, Navy, and Air Force installations, which represents 11 military installations with 14 sites. Training provided by Virginia Cooperative Extensions state, local staff, and volunteers, helps military staff deliver a variety of programs and projects focused on experiential learning and the development of life skills to military youth.

What has been done
A 4-H Military Club Director was responsible for gathering, compiling, and submitting reports for the 4-H Military Partnership Grant provided by the Department of Defense. Local support of each installation site was provided by Extension Agents located in the county or city near each respective installation. Four part-time 4-H Installation Club Coordinators provided support to 4-H staff responsible for chartering clubs, enrolling members, training club leaders, and involving 4-H military club members in local, regional, and state programs. Branch focus area greatly influenced the identification of outcomes which gave staff direction as they planned programming to develop life skills in the youth. 4-H project focus areas were Citizenship, Healthy Living, and Science, Technology, Engineering, and Math (STEM). Citizenship: Projects included 4-H Day at the Capitol, club officer training, presentations, theater arts, service learning, character education, bully prevention. Healthy Living: Projects included 4-H Cooking, Dashboard Dining, Teen Cuisine, First Aid, and Steps to a healthy teen. STEM: Projects included National 4-H Youth Science Day Experiment ?Motion Commotion, Junk Drawer Robotics, Environmental education, and Gardening.

Results

Youth Participation by military branch was:
Army: 3 installations with 6 chartered 4-H clubs and enrolling 715 youth.
Navy: 7 installations with 13 chartered 4-H clubs and enrolling 661 youth.
Air Force: 1 installation with 3 chartered 4-H clubs and enrolling 411 youth.
Participants were invited to complete the 4-H Common Measures evaluation. One hundred twenty-nine (129) youth completed the evaluation. Responses showed the following results in the three project focus areas.
Citizenship: As a result of participation in this 4-H program, 88% of respondents agreed or strongly agreed that they don?t let their friends talk them into doing something that they don?t want to do. 90% of respondents agreed or strongly agreed that they can apply knowledge in ways that solve ?real-life? problems through community service.
Healthy Living: As a result of participation in this 4-H program, 93% agreed or strongly agreed that they learned how to make healthy food choices. 85% agreed or strongly agreed that they now eat more fruits and vegetables.
STEM: As a result of participation in this 4-H program, 85% agreed or strongly agreed that they want to learn more about science. 94% agreed or strongly agreed that they like experimenting and testing ideas.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #16

1. Outcome Measures

Connecting Geographically Dispersed Military Youth to 4-H

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2016	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia is home to over 26,000 National Guard and Reserve members ranking 8th in the nation (Profile of the Military Community, 2013). Many of these members have children who are considered to be geographically dispersed youth living off military installations. Since these youths do not participate in established 4-H clubs on installations, there is a renewed emphasis by the 4-H Military Partnership to strengthen connections to the local 4-H program. A Virginia 4-H program can be found in all counties and most cities. 4-H through Virginia Cooperative Extension provides a support network to help military youth develop skills to assist them with becoming more resilient in the face of change and adaptive in navigating everyday life. A beneficial 4-H experience for youth is to participate in camping, and camps have gained popularity as a means to engage with military youth (Ferrari, 2015).

What has been done

Funding provided through the Virginia 4-H Military Partnership Grant were made available to provide partial scholarships to geographically dispersed military youth to attend 4-H summer camp or the Virginia 4-H State Congress. Grant funds totaling $5,000 were allocated for scholarships and distributed. All correspondence related to the scholarship and participation in the event was conducted by the Extension Agents at the local level.

Results

In 2016, thirty-one geographically dispersed military youth, representing twelve different counties, received scholarships. These youths represented the Army, Navy, Army Reserve, Army National Guard, and Air Force Reserve branches of the military. Youth participants responded to a follow up survey. Participants shared that they grew connections and developed positive relationships while at camp. They also shared that they learned more about themselves while participating in 4-H. One participant stated that ?I can learn ?how to? outdoors? while another stated that ?while at camp, others comforted me when I got a little homesick?. A parent responded that ?my favorite thing about 4-H camp was having my son experience all the fun of outdoors and friends, and being unplugged?.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth 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 (Transportation and facilities)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
5176	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
3	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
98	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
12	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
13200	Tons of feedstocks delivered.