2017 Virginia State University and Virginia Polytechnic Inst. & State University Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

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

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

VAES, VSUARS, and VCE PROGRAMMATIC GOALS:

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

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

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

added plant and animal products.

PLANNING: VAES, VSUARS, and VCE address a broad range of problems and issues facing citizens of Virginia through focused research and educational programming. The foundation for Research and Extension programs are built on the identification and prioritization of strategic issues through situation analyses, which are accomplished through the examination of trends and emerging issues identified by local advisory groups in Unit offices (Extension Leadership Councils), AREC Advisory groups, and individual Extension specialists. In 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: Beginning in 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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	377.3	28.0	329.1	15.5
Actual	351.0	28.4	262.0	16.0

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 VAES Associate 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, following the REEport guidelines, 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/NIFA 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, AREC Advisory Boards, 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. A statewide update of the unit situation analysis will be conducted in 2018.
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.

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 V AES 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 (e.g. AREC Advisory Boards) 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 eleven 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.

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.
In addition, a study was commissioned to assess current impacts of VAES and VCE on the economy and to gather recommendations from industry. Advisory council members and other stakeholders were invited to participate in interviews for this study. The Virginia Tech Office of Economic Development (OED) conducted the economic impact study for Agency 229, which provides funding to VCE and VAES. OED spoke with over 200 stakeholders from private industry; local and state government; VCE agents, specialists, volunteers, and clients; VAES researchers; and many agricultural councils and commodity groups.

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.
A report was prepared by the Virginia Tech Office of Economic Development on the Impact of Agency 229. This report was compiled into a report describing the findings.

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. We are continuing to work towards these goals until completion of the 2018 situational analysis process is complete.

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.
The Agency 229 impact report illustrated how Agency 229 (VAES, VCE) research and extension program bring investment into Virginia and helps with economic growth and job creation. Outputs

included research results (reports, publications); presence in 107 rural and urban communities through the commonwealth; strong relationships with producers and partnerships with private industry; and leveraging of federal and state funding to support research and Extension activities. In summary, outcomes of these outputs lead to environmental benefits, perception of Virginia as a grower of premier products with a strong workforce, better management practices, more money staying in local/state regions, and knowledge about how to live a health life. The value of this effort (impacts) include higher returns and profits, more Virginia jobs, greater investment in Virginia companies, increased economic resources (money in pockets) of Virginians, and greater potential for knowledgeable, healthy citizens.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{No Data Entered}	{No Data Entered}	{No Data Entered}	{No Data Entered}

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	9548224	2530670	3700926	2783509
Actual Matching	12350176	2313610	10565490	2892707
Actual All Other	27513730	978839	53926012	1136045
Total Actual Expended	49412130	5823119	68192428	6812261

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	0	0	0	1169386

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	4%	0%	5%	0%
212	Pathogens and Nematodes Affecting Plants	1%	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	3%	40%	5%	0%
604	Marketing and Distribution Practices	2%	20%	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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	130.3	16.0	219.7	10.5
Actual Paid	125.2	22.4	145.1	8.0
Actual Volunteer	5538.0	63.0	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
3315085	1977630	2058423	1391755
1862 Matching	1890 Matching	1862 Matching	1890 Matching
4287905	1917872	5876433	903971
1862 All Other	1890 All Other	1862 All Other	1890 All Other
9552599	934113	29993176	420504

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?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	408758	1500903	136245	16344

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

Patent Applications Submitted

Year: 2017

Actual: 1

Patents listed

Compositions and Methods Comprising Colletotrichum for Controlling Plant Species (9642371)

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	68	25	93

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of publications created.

Year	Actual
2017	581

Output #2

Output Measure

- Number of Extension presentations delivered.

Year	Actual
2017	1970

Output #3

Output Measure

- Number of peer-reviewed journal articles published.

Year	Actual
2017	62

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 in the adoption of IPM practices
2	Adoption of value added marketing practices through the VQA weaned and preconditioned program improve profits
3	Direct marketing education improves long term sustainability
4	Aquaculture producers improve profitability through enhanced management
5	Farm operators use Market Maker to enhance direct marketing
6	Farms initiate transition plan resulting long-term agriculture sustainability
7	Beginning farmers implement whole farm planning goals
8	Farms develop agritourism enterprises
9	Methods for improving water systems and aquaculture practices enhances fish management systems
10	Controlling invasive pests through biological controls and management strategies
11	Improving grazing and grasses management for agriculture sustainability and value
12	Plant breeding and genomic characterization for value-added variety development and agriculture sustainability
13	Integrated management of plant-pathogenic nematodes and diseases through sustainable crop production practices
14	Increase number of producers that are improving animal performance through forage system management strategies
15	Specialty crop producers implement sustainable crop production practices
16	Limited-resource small ruminant producers improve their profitability through adopting best management practices
17	Community gardens and urban ag enterprises improve urban food availability

18	Limited resource farmers improve their sustainability and profitability through diversifying into alternative farm enterprises and entering new markets.
19	Limited resource farmers improve their profitability through adoption of best management production or agribusiness practices
20	Growing profitability for Virginia's urban agriculture businesses
21	Increasing producer sales of lamb products grown in Virginia through consumer awareness
22	Equipping Virginia small farmers to compete for lucrative berry markets in Mid-Atlantic US
23	Adding Value through the Virginia Beef Quality Assurance Program
24	Protecting Water Resources and Chesapeake Bay Watershed with Horticultural and Crop Irrigation Strategies

Outcome #1

1. Outcome Measures

Increase in the adoption of IPM practices

2. Associated Institution Types

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

importance of a long-standing series of orchard fruit schools has therefore grown.

What has been done

Faculty involved in tree fruit industries in Blacksburg and the ARECs (Entomology, Plant Pathology and Horticulture) participate in a week-long series of full day fruit schools in February. A sixth school in Southside was added in 2015. The VCE agents in each participating region take the lead in organizing each school. Technical issues are presented in a venue that encourages participation from fruit producers, both in the form of questions as well as contribution of ideas. VCE agents are central to the planning of these fruit schools, both in terms of logistics and organizing stakeholder input in program development.

Results

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

A recent survey (https://pubs.ext.vt.edu/AREC/AREC-135/AREC-135.html) of fruit producers and crop advisors indicated that:

* 95.1% of survey respondents have used information from fruit schools to help guide their application of pesticides.
* 98.0% of survey respondents reported that the fruit schools had been helpful or extremely helpful in improving their ability to manage pest problems. Several growers noted that they were now rotating insecticide classes to reduce resistance; or were using different pesticides, including mating disruption; or had lowered the rates used.
* Of the 74 participants who answered the question, "How has using the information from Fruit Schools affected the profitability of your operation (or the operations of the growers you consult with)", 34 (45.9%) reported an increase, 39 (52.7%) reported no change, and only 1 (1.4%) reported a decrease in profitability. Thirteen growers estimated their yearly increase in profitability based on using the information from fruit schools. These estimates ranged from $300 to $200,000. The total of these 13 estimates was $600,600.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Adoption of value added marketing practices through the VQA weaned and preconditioned program improve profits

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There is a great variation in the pricing of Virginia-produced feeder cattle in part due to their differences in real value and in part due to the manner in which these calves are marketed. Adding value to Virginia's beef cattle operations is critical to sustainability of Virginia agriculture and rural communities. Adopting improved health, management, and marketing practices for Virginia feeder cattle adds value to the Commonwealth's second largest agricultural commodity.

What has been done
Extension Specialists and Agents partnered with the Virginia Cattlemen's Association to continue to develop and implement this program which encourages the use of scientifically based cattle health and management procedures for feeder cattle. The VQA program is a cooperative effort among VCE, the Virginia Cattlemen's Association, VDACS, VMRCVM, and producer organizations. Producers that handle their cattle in this manner are eligible to market their calves through the VQA certified feeder cattle program.

Results
In 2017, a total 17,486 calves were marketed through the VQA program. Producers received a premium of $87 per calf resulting in $1.52 million of additional income for Virginia beef producers. Since 1997, producers have marketed over 200,000 head of feeder cattle resulting in $10.4 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
604	Marketing and Distribution Practices

Outcome #3

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
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Increasing consumer demand for local foods in Virginia has opened direct market outlet opportunities for new and existing extension clientele in the form of online sales, farmer's markets, CSAs, food hubs, and value added products.

What has been done
In 2017, The Virginia State University (VSU) Cooperative Extension Marketing and Agribusiness Program conducted 23 educational programs in collaboration and partnership with Virginia Cooperative Extension field faculty (ANR, FCS, CV), VSU Small Fruits & Vegetable Program, VSU Small Ruminants Program, VSU Sustainable Urban Agriculture Program, and the Virginia State University Small Farm Outreach Program which equipped: 154 small, limited resource (LR) farmers improved their farm market displays; 52 military veterans increased knowledge and skills on how to add economic value to farm grown produce, 29 beginning urban farmers were trained and developed personal farm budgeting spreadsheets; and 15 LR farmers learned about and accessed new market outlets in Virginia.

Results
As a result of learning new marketing and business skills, 79% (197) of program participants estimated their on-farm income would increase a minimum of 10%, or on-farm earnings would be increased a minimum of $1,000, with a total participant estimated income increase of $197,000 during the market season (April-Oct) after participating in hands-on marketing and business skill building classes through their local county extension offices and other stakeholder extension partners.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Aquaculture producers improve profitability through enhanced management

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Constantly sustained temperature controls are necessary and required in the food cold chain from water to fork for maintaining safety and quality of aquacultured oysters.
Oyster producers, freight carriers, wholesalers, food retailers and restaurants were identified as participants in the aquacultured oyster food cold chain.
We wanted to know how well these temperatures were controlled within the food cold chain and the effect of interactions amongst the identified participants.

What has been done
In order to better understand temperature control in the oyster food cold chain from water to fork, I collaborated as a sub grant PI to a funded NOAA grant originally written by Dr. Dave Love of Johns Hopkins University, Dr. Michael Jahncke of Virginia Tech and others in a study, using a mixed-methods approach including quantitative measurements of oyster internal and storage environment temperatures qualitative interviews of supply chain members and predictive food safety modeling of based upon the temperatures found.
The study focused on aquacultured single oysters raised in the Chesapeake Bay Watershed and distributed to Virginia, Maryland, Delaware, Washington DC and Southern Pennsylvania areas.
Incentives for participation in the grant were the boxes of oysters used in the grant were paid for and the individual food cold chain oyster internal and storage environment temperatures were reported back to the participant for their records.
One-hundred-fifty-six (156) temperature sensors were used in boxes of oysters from February 2017 through September 2017 passing through the food cold chain of thirty-nine (39) participants.

Twenty six (26) participant interviews including 6 oyster producers, 4 freight carriers, 2 wholesalers and thirteen (13) food retailers and restaurants were performed to obtain their input in the oyster food cold chain.

Results

From the initial 5,250 hours of data collected cold abuse (oyster internal temperature below 35°F) was identified an issue in cooler months. Cold abuse causes oyster to gape open, loose moisture and die reducing the shelf life and ability to receive the market value of the oysters.

Warmer weather data found challenges maintaining oyster environment storage temperatures below 45 °F. Five (5) of twenty-five (25) shipments during the summer months found that measured oysters internal temperatures crossed the threshold of fifty (50) °F to a maximum of fifty-four point five (54.5) °F for over an hour after initial chilling and introduction into the total time of the food cold chain from water to fork.

We found that each participant in the supply chain maintained some aspect of temperature control but also needed some enhancement of temperature control. These enhancements included upgrading facilities, equipment, improving processes and better training for employees in operating and process procedures.

As part of the project study one of the grant collaborators will take the temperature data and model it to determine the temperature effects on the doubling of Vibrio paraheamolyticus over time.

A peer reviewed paper including more details of the grant, the study and the results has gone through the peer review process and has been submitted to the publisher of the Journal of Food Protection.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #5

1. Outcome Measures

Farm operators use Market Maker to enhance direct marketing

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual

2017 0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Southside region has seen the arrival of many new landowners in recent years wanting to start a farm business but with little-to-no prior experience in farming or the region itself. Virginia Cooperative Extension unit offices have primarily addressed their questions on an individual basis but recognize a benefit to bringing the full range of beginning farmers ?under one roof? in order to help these new landowners become better connected to the agricultural community of Southside including their neighboring farms as well as local representatives of agricultural agencies. Additionally, a survey conducted in 2015 indicated a desire among farmers and food entrepreneurs in Southside to sell their products to retail and institutional buyers, to participate in educational workshops on marketing and advertising, and to engage in networking opportunities and events with potential buyers.

What has been done

A one-day event called ?Cultivating Connections: A Marketing and Networking Event for Beginning Famers in Southside? was held to assist beginning farmers grow their market presence. The primary goals of this event were to expose beginning farmers to regional and statewide marketing resources that exist to connect farmers with buyers and to facilitate relationships between beginning farmers and marketing outlets including potential wholesale buyers. The program was a mixture of presentations, roundtable discussions, and networking. As a new statewide initiative, Market Maker accounted for the largest portion of the speaker presentations and program participants were able to register for Market Maker during the event. Market Maker was followed by a short presentation on the Virginia Grown and Virginia Finest programs, highlighting the free marketing materials that farmers can access through VDACS. A presentation on the Virginia Beginning Farmer and Rancher Coalition was also given to demonstrate the existing statewide network of beginning farmers available for knowledge and resource sharing. Following the presentations were three consecutive round-table discussion sessions that rotated at 20-minute intervals. During the round-table sessions, participants were able to explore marketing options including food hubs, produce auctions, value-added production, farm to school, and accepting SNAP benefits. Additionally, representatives from agricultural support agencies and organizations, such as Farm Service Agency, Heart of Virginia Buy Fresh Buy Local, and Local Roots Food Co-op, set-up informational tables to inform participants of their services. Cultivating Connections was funded by the Virginia Beginning Farmer and Rancher Coalition mini-grant program.

Results

Cultivating Connections was attended by 39 participants. Half of the survey respondents described themselves as startup farmers and 14% reported no background or experience in farming. Participants reported significant knowledge gain about how to make more informed decisions about marketing-related opportunities available to beginning farmers in Southside, people to contact for support about marketing-related opportunities available to beginning farmers in Southside, and additional resources to access regarding marketing-related opportunities available to beginning farmers in Southside. Many participants reacted very positively to the event, expressing their satisfaction and gratitude for the opportunity to learn about available resources and connect with fellow farmers. Several participants expressed a belief that Cultivating Connections should be held on an annual basis. Additionally, information collected during this event was used to develop the Beginning Small Farm Exploratory Workshop held in Farmville in November. Specifically, information was collected in the evaluation on type of products

participants grow/raise, which gave insight to the topics covered during the Beginning Small Farm Exploratory Workshop. Both of these programs are a part of an effort to provide education and training to the beginning farmer population in Southside.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Farms initiate transition plan resulting long-term agriculture sustainability

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Preparing for the future is critical! Knowing if and at what age you can retire is a huge challenge that farmers are finding difficult to understand. Even more challenging is not knowing if the next generation can afford to pay the estate taxes and take over the farm.

What has been done
uring the entire month of July, farmers in Franklin County, Virginia met each Thursday to discuss long-term goals for transitioning and succession farming. Funding from Virginia Department of Agriculture and Consumer Services and purchasing of Ag license plates made the program available in Franklin County. The month long, series brought together multigenerational farms looking to understand how to plan correctly for each new member joining and those leaving the family farming business. Thanks to a great line up of guest speakers, farmers were able to learn some very important concepts.

Results
During the program we learn only 2 farms had wills in place, with only one updated in the last 3

years. The rest of the eight farms that attended the program had no wills in place. We also learned that with the German Baptist producers in Franklin County, members of the old order church do not have wills in place. Our goal was encourage producers to start the process of encouraging producers to get wills and insurance in place within the next year at most.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Beginning farmers implement whole farm planning goals

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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

One Qualtrics survey was distributed to approximately 224 individuals, with 38 responses being received. The second Qualtrics 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).

A Personal Story:

Many participants indicated that they appreciated the ability to network with service providers at the whole farm planning trainings:

"I was really struck by how encompassing the program was. Included talk from speakers in the field with experience and expertise. A very well-rounded, realistic approach that went beyond romanticism. I really appreciated that. Also felt like I left the class and had connections I could reach out to for help- both speakers (ex Farm Credit) and classmates (fellow farmers in all stages and dynamics)."

Respondents noted that the resources and skills they learned at the trainings continue to be useful:

"The program continues to provide resources and education in assisting me as an Extension volunteer and Buy Fresh Buy Local member in helping local farmers / ranchers find the resources to help them."

Setting goals and making plans for the farm was another lesson that respondents learned in their trainings:

"Understand your goals and plan carefully, use the many knowledgeable agriculture people available to you, and don't invest more than you can afford to lose."

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Farms develop agritourism enterprises

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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's regional economic impact. Findings indicated that over 70 percent of the Virginia agritourism operations have increased revenues from agritourism functions. However, fiscal impact data were absent from the study and additional research is needed.

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 regional workshops. Extension coordinated and hosted the 2015, 2016, and 2017 two or three-day conferences featuring over 40 speakers and serving approximately 160 registered participants; offered regional agritourism workshops for local agritourism entreprenerus; and engaged in one-on-one conversations with multiple farmers.

During 2017, regional workshops were held Dinwiddie, Smyth, and Halifax/Pittsylvania. Agritourism presentations were made at the regional Veterans Farming Conference held in Halifax, as a webex for the Virginia Cooperative Extension 2017 Winter Conference, and at the Southeast Virginia Farm Bureau Woman's Program District Meeting. Extension collaborated with Montgomery, Pulaski, and Giles Counties on a Virginia Tourism Corporation grant application to help move local agritourism efforts forward as part of the "Blue-to-New" branding campaign for

local products and on-farm events. The Southwest Extension team also worked with a local grain and food production/safety specialist to host the Virginia Field to Glass workshop and Farm Tour held at the VT Brewhouse and Sinkland Farm in Riner, Virginia. During this workshop participants discussed barley, wheat, other grain, and hops production and how the grains are used to make distilled and brewed alcoholic beverages. Each conference and multiple county-based agritourism workshop are planned by a coalition of state/local agency representatives who contribute their time and invest their resources.

Extension maintains a statewide listserv with over 770 members and continually publishes agritourism resources through this electronic tool. At the request of the Virginia Secretary of Agriculture and Forestry in 2016, Extension worked with the Virginia Department of Agriculture and Consumer Services to build a partnership with the counties of Augusta, Halifax, Loudoun, and Rockingham and the New River Valley Regional Commission and secured funding for the 2016-2017 economic and fiscal impacts of agritourism in Virginia study. With the New River Valley Regional Commission serving as the fiscal agent, the counties 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 2016 Agritourism Fiscal Impact Study was released at the 2017 agritourism conference held in Richmond. The findings indicated agritourism drives $2.2 billion in economic activity, hosts over 7.5 million visitors with over 42 percent nonlocal visitors, supports 22,000 jobs, pays $840 million in wages and salaries, and produces $135 million in state and local taxes. Overall, Virginia's agritourism industry generates a $1.5 billion economic impact. The project team delivered presentations at the Virginia Association of Assessor Officers two state conferences, included conversations with agritourism entrepreneurs, and worked with the assessors to better understand this agricultural industry. Currently, the final report is housed on the Virginia Tourism website https://www.vatc.org/wp-content/uploads/2017/06/TheEconomicAndFiscalImpactsOfAgritourismInVirginia.pdf

Results

Over 90% of the farms reported an increase their knowledge and/or skills and indicated 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.

Virginia Department of Commerce and Trade which includes the Virginia Tourism Corporation 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. The 2016 Agritourism Fiscal Impact Study validated the economic activity and its impact on the local economy. Agritourism operations are continuing to expand their plans, communities are preparing zoning ordinances that support the farm operations, and Virginia agencies are collaborating and building a stronger support system for agritourism.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Methods for improving water systems and aquaculture practices enhances fish management systems

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Bacterial diseases and fish health management problems influence water quality and economics in the aquaculture industry. Major economic losses can occur with poor management. The use of antibiotics for addressing diseases is controversial. Knowledge about alternative, cost-effective options to antibiotics for promoting fish health are sought. Seafood and aquaculture industries, regulatory agencies, food industries, and consumers all benefit when production systems are well managed.

What has been done
The use of cost-effective alternatives to antibiotics were implements in striped catfish and Nile tilapia in recirculating aquaculture systems. Probiotics were evaluated as an alternative option. Immunology, hematology, and plasma chemistry of the fish were evaluated.

Results
Dietary supplementation with tested probiotic strains stimulated local and systemic innate immune responses of tilapia. A pro-inflammatory environment response was evident and plasma chemistry responded to the dietary modification. The findings help explain the potential mechanism of action observed when probiotic strains are added to the diet. This study developed new approaches that may be helpful in evaluating fish health and welfare in recirculating aquaculture systems as well as provide alternatives for minimizing antibiotic applications in aquaculture.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
307	Animal Management Systems
311	Animal Diseases

Outcome #10

1. Outcome Measures

Controlling invasive pests through biological controls and management strategies

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Relevance: In 2011, we detected a new invasive insect, spotted wing drosophila (SWD), Drosophila suzukii, in Virginia for the first time. This fly is unlike other species in the drosophilid family in that it attacks ripening fruits of it host species, rather than overripe or rotting fruit as in other fruit flies. SWD poses an immediate threat to berry crop growers, sometimes causing total crop loss. Control efforts currently rely almost entirely on repeated applications of insecticides, posing a severe risk of pesticide resistance. There is little information available on natural enemies of SWD, and none in the mid-Atlantic region. There have been anecdotal reports of SWD infestations in tomato, a major crop not on the SWD host list. During the course of these investigations, we discovered the presence of yet another invasive drosophilid fly, African fig fly (AFF), Zaprionus indianus, which sometimes had higher infestation levels in grapes than SWD. Its role as a fruit pest is still unclear. While evaluation SWD injury in grape clusters, we noted that many oviposition sites are in the interior of clusters. By the time berries become most vulnerable to attack, berries have grown and clusters have closed, preventing insecticides from reaching vulnerable surfaces.

What has been done
A web page was developed discussing SWD and AFF, their biology, injury and potential control (http://www.virginiafruit.ento.vt.edu/SWD.html). We are exploring trapping and host plant interactions of SWD in grape, berry and tomato, as well as ecological interactions with AFF. We are surveying for hymenopteran parasitoids of SWD, AFF, and Drosophila melanogaster, in several cropping systems. We conducted chemical control trials utilizing a feeding bait, in an effort

to reduce the amount of insecticide applied. Because some oviposition sites are on interior surfaces of grape clusters, we investigated applications of insecticides just before clusters close. We showed that such early treatment using kaolin, an organic insecticide, can reduce injury at harvest by 50%. I disseminated information to growers through Scholar sites devoted to berry crops and vineyards. Oral presentations were made to Virginia and regional stakeholders, in addition to scientific conferences.

Results

This is very much a work in progress, since we are still developing an appropriate response to SWD. We made growers aware of this pest, allowing growers to minimize injury. We provided information the most effective insecticides, addressing multiple complicating factors: efficacy, resistance management, preharvest restrictions, and label restrictions on maximum seasonal applications. We have improved our understanding of seasonal phenology in our winegrape vineyards, and are now collecting data on the competitive interactions between SWD and AFF. We now have evidence that AFF infestation follows attack by SWD, and AFF may outcompete SWD within the host fruit. We have shown that larval mortality of SWD is greater when in competition with AFF (which cannot injure fruit on its own), and SWD has reduced body size after such interactions. We are documenting that SWD has few naturally occurring parasitoids in our area. We have shown that while female wasps may initially lay eggs in SWD larvae, these parasitoids are unable to complete development. Success is even lower against AFF. This helps lay the groundwork for classical biological control efforts. We showed that kaolin (an organic control tool) applied as clusters close (although well before the time when grapes become vulnerable), reduces injury at harvest by 50%. We now also have evidence that SWD may be able to penetrate intact tomato fruit.

4. Associated Knowledge Areas

KA Code	Knowledge Area
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

Outcome #11

1. Outcome Measures

Improving grazing and grasses management for agriculture sustainability and value

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual

2017 0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Producing and feeding conserved forages has some of the greatest negative economic and environmental impacts for livestock production systems. The 2011 Virginia Cooperative Extension Farm Enterprise budget for a spring calving herd shows that over 50% of the variable cost are for hay. Research conducted in Virginia shows that a 40-head cow/calf operation in the state can potentially save $166 per head per year in expenses if the farm shifts from continuous grazing to practices that include rotational grazing, stockpiling fescue, and purchasing hay. University of Kentucky research suggests that producers feeding hay at a purchase price of $80/ton will operate most profitably at zero to 60 days of hay feeding. Survey data indicates that Northern Shenandoah Valley livestock producers typically graze 228 days per year. Only a small handful of producers in Virginia's Piedmont and Shenandoah Valley regions regularly approach or achieve a 300-day grazing season. The long-term profitability of cow/calf production throughout Virginia and the South will require many farmers to extend the number of days they graze their cattle above the typical 228-day timeframe. To improve long-term profitability and environmental outcomes, most producers need greater knowledge of the management skills and infrastructure required to extend the grazing season.

What has been done

In 2016, a newly branded statewide Extension educational program was initiated called Graze 300 VA. The goal is to increase the number of livestock producers that extend their grazing season. Grazing 300 days per year will not be realistic for all but will be achievable and more profitable for many. Collectively, agents have conducted two pasture walks, demonstrated how to measure standing forage, organized five field days (warm season grasses, switchgrass management, equine pasture management, grazing economics), discussed how to mitigate the effects of endophyte infected tall fescue, conducted four demonstrations on stockpiling forage, created four videos (summer stockpiling forage, grazing summer annuals), and have consulted on numerous farm visits. We have plans to (1) create four or five educational videos on Graze 300 appropriate topics (2) document multiple case studies that show economic benefit of improving grazing management (3) conduct multiple educational events statewide including meetings, twilight tours, on-farm demonstration and farm consultations.

Results

Since the launch of the program in 2016, buy in by agents into Graze 300 increased 73% and was one of six action plans (40 total) seeing an increase over the same period. To date, 545 producers have attended an Extension forage program related to Graze 300, six farmers have implemented strip grazing to better utilize their forages, two have implemented rotational grazing, and ten farmers are developing grazing strategies that will help them further extend their grazing season. We anticipate significant financial and water quality benefits from this educational effort. Over 96,000 beef cows are raised in the Northern Shenandoah Valley and Northern Piedmont regions of Virginia (Census of Agriculture, 2012). If only 20% of the farmers (representing about 19,000 cows) extended their grazing season and subsequently reduced their operating costs by $100 per head per year, the economic benefit to these regions would be $1,900,000 per year. When extended to the entire Virginia beef cow herd, 20% of that population or 130,000 cows can generate an addition to participant's bottom line of $13 million from the cost savings. Producers who graze in winter indicate their animal performance is equal to those cattle under hay feeding management. There will also be horse, sheep and goat farmers who will see financial benefit from extending their grazing seasons. Extending the grazing season will also benefit water quality,

which is particularly important in the Chesapeake Bay watershed. Managed grazing systems (which include rotational grazing) have increased vegetative cover on pastures, improved manure distribution, improved water infiltration and resulted in greater soil quality. The Chesapeake Bay TMDL gives nutrient and sediment credit for every acre of pasture converted into a grazing management system and every foot of stream where livestock are excluded.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
302	Nutrient Utilization in Animals
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection
601	Economics of Agricultural Production and Farm Management

Outcome #12

1. Outcome Measures

Plant breeding and genomic characterization for value-added variety development and agriculture sustainability

2. Associated Institution Types

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Soybean is an important economic crop for the US agriculture. It is used as protein source for human and animal, with a protein content of about 40%. Modifying both protein quantity and quality (content of essential amino acids) would help decrease the cost of feed and reduce pollution associated with feedlot runoff. Soybean breeders, crop improvement industries, seed

growers, and animal feed industries and producers benefit from new soybean breeding lines with improved protein quantity and quality.

What has been done

Numerous Quantitative Trait Loci (QTL) have been identified as responsible for the high protein trait in seeds in soybean. Additionally, previous data support the notion that the amount of protein stored in the seeds depends in part from the supply of amino acids from the leaves. Researchers at Virginia Tech (Blacksburg) looked for variability in the sequence of amino acid transporter genes located near high protein QTLs, hypothesizing that some variability is responsible for change in protein amount in seeds. They screened several lines to evaluate for the variability.

Results

They dentified a gene located close to a major high protein QTL and encoding a gamma-amino-butyric acid transporter. The polymorphism in this gene 1) affects the transport properties of the protein and 2) is associated with high protein cultivars. Identification of the polymorphism will greatly help future breeding of new soybean cultivars with increased seed protein content. This research would also help understanding the mechanisms controlling seed protein content.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
601	Economics of Agricultural Production and Farm Management

Outcome #13

1. Outcome Measures

Integrated management of plant-pathogenic nematodes and diseases through sustainable crop production practices

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Plant parasitic nematodes are a major constraint to crop production throughout the southeastern United States. In 2017, it is estimated that at least 5% of cotton, peanut, and soybean yields in Virginia were lost due to parasitic nematodes. This is equivalent to a loss of over $10 million in farm revenue. Few safe, economical, and effective approaches to nematode management are available. New and integrated approaches to nematode management are necessary to maximize yields and profitability of cotton, peanut, and soybean production in Virginia and throughout the southeastern U.S.

What has been done

Local and regionally coordinated trials were conducted to evaluate standard, new, and experimental chemistries for nematode control and to evaluate performance of different crop varieties under varying levels of nematode pressure. A survey of nematodes in cotton, peanut, and soybean production areas in Virginia was initiated in 2015 and continued in 2016 and 2017 to evaluate the presence and population numbers of yield-damaging nematodes in the state.

Results

Distributions of economically important nematodes have been determined, and the efficacy of in-furrow and seed treatment nematicides has been evaluated for crops including cotton, peanut, and soybean. Nematode management recommendations based on economic damage thresholds and the efficacy of different nematicides have been disseminated to growers in the region through field days and crop production meetings. Adoption of these management tactics will reduce the use of environmentally detrimental products while maintaining or increasing crop yields.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
204	Plant Product Quality and Utility (Preharvest)
212	Pathogens and Nematodes Affecting Plants

Outcome #14

1. Outcome Measures

Increase number of producers that are improving animal performance through forage system management strategies

2. Associated Institution Types

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Virginia Horse Industry is an important part of the state?s agricultural landscape and the economy. The industry has a $1.2 billion economic impact, and while other types of farms in the state are declining, the number
of horse farms continues to grow. Many of the horse farms in the state are near urban or suburban areas and are often managed by individuals new to farming with limited acreage that requires unique best management
practices to protect horse and environmental health. Poor pasture and land management from horse farms is a major cause of non point source pollution and water quality degradation. Horse farms are concentrated in the Chesapeake Bay watershed, where water quality is a pressing concern. Unthrifty pastures also present concerns with toxic plants, parasite transmission and inadequate nutrition.

What has been done
A number of multi-disciplinary projects, programs, and regular events were developed and implemented to connect equine land managers and horse owners with the latest science-based information promoting equine
and environmental wellbeing. Pre and post evaluations were used to asses knowledge gained and adoption rate of conservation practices. A conservation practice model farm was developed at the Middleburg Agricultural Research and Extension Center to serve as a pivotal resource to demonstrate and educate clientele in a-hands on setting. Research has been conducted to improve management practices for horses and environmental health including: the effects of BMPS; the use of novel turgrasses for grazing systems; the effects of seasonal variation in pasture nutrient content; and nutritional supplements. Research and education programs help train students and the public.

Results
Programs targeting improved horse and environmental health have resulted in an increase in knowledge of participants who indicated they would adopt a new conservation practice. Rotational grazing, proper soil testing, manure composting and the use of loafing areas to reduce erosion are among the primary practices adopted by land managers. Initial results from participants indicates the need to increase programmatic efforts addressing forages, pasture management and conservation practices as they relate to horse health. Enhancing equine and environmental well-being ultimately promotes the sustainability of an agricultural industry key to the state?s economy.</Expr1><Expr1>, Relevance Assisted with and supported the planning for Equine and Stewardship Programs. Digitally recorded the Healthy Land Heathy Horses programs series and presented the VCE Loudoun Rainfall Simulator at MAREC programming. Pasture management programming forms one of VCE Loudoun?s pillar education programming efforts. Many of the principles and practices communicated in pasture management classes and farm visits, particularly those focused on improving soil health, are consistent with residential/corporate lawn and grounds maintenance practices. This commonality facilitates VCE Loudoun Faculty programming efficiency and provides a significant role for VCE programming in the County Government?s overall efforts to reduce TMDL loads and comply with Federal and State mandates

using soil health education programming. Additionally, this commonality increases VCE programming relevance to learners residing in all of Loudoun?s voting districts, both rural and urban, while preserving the traditional close-support that VCE has provided to Loudoun?s rural residents.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
302	Nutrient Utilization in Animals
307	Animal Management Systems

Outcome #15

1. Outcome Measures

Specialty crop producers implement sustainable crop production practices

2. Associated Institution Types

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Vegetable and specialty crop production is expanding as the demand for locally grown produce continues to rise.
Increasing the production efficiency can increase profit to producers and decrease cost to consumers; reducing environmental (soil, water, and air) degradation will benefit producers and society; and improving business management will increase profitability and, thus, viability of producers. Some of this increased demand for local produce is being filled by new producers while some is through expanded production on existing farms. Our goals were document an increase production knowledge and efficiency while increasing the number of farms and total production area of vegetable and specialty crops in Virginia.

What has been done
To establish existing conditions, a Qualtrics survey tool was developed to (1) collect existing (baseline) farm details (number of farms, total acreage, classification (defined acreage, small, medium, large), diversity and tonnage of crops produced in their local area, (2) capture the number of educational programs and participants and new VCE resources, (3) assess pre/post training knowledge and "intent to implement" information of participants in producer training meetings.

Results
Agents and specialists on the Action Plan conducted 83 meetings including 765 participants in 2017 across Virginia. Agents conducted 7 on-farm demonstrations or field trials while specialists conducted more than 14. Agents also conducted farm visits with beginning or existing farmers on production and food safety issues. A total of 84,496 contacts were reported for the sustainable vegetable production Action Plan. Agents and specialists generated 33 new VCE resources for specialty crop farmers. As a result of educational programming, agents estimated participant increase in knowledge at 85% and increase in practice adoption or implementation at 68%. In addition to production practice skills, vegetable growers gained skills and knowledge to comply with revised EPA Worker Protection Standard regulations as well as the newly enacted FDA Food Safety Modernization Act Produce Safety Regulation.

One specialists had seven graduate students and three undergraduates working on vegetable IPM projects. In addition, at least one agent made 40 farm visits in cooperation with the specialist in evaluating on-farm pest pressure in sweet corn. Agents primarily utilized the Mid-Atlantic Fruit and Vegetable Conference in Hershey PA and the Southern Region Fruit and Vegetable Conference in Savannah GA to meet their professional development needs.

4. Associated Knowledge Areas

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

Outcome #16

1. Outcome Measures

Limited-resource small ruminant producers improve their profitability through adopting best management practices

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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 in sustainable integrated parasite management techniques and assistance in determining the status of dewormer resistance on their farms in order to develop effective parasite control strategies.

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 250 producers and agents on small ruminant internal parasite management
- 60 small ruminant producers received FAMACHA© certification
- 60 producers developed skills in conducting fecal egg counts
- Three 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 #17

1. Outcome Measures

Community gardens and urban ag enterprises improve urban food availability

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

he 2013 Situation Analysis update identified several programming needs for Montgomery County citizens. Among these were programs to address agriculture sustainability and preservation including the promotion and support of local food systems and programs to improve overall family health and well-being (mental, physical, social, financial, and spiritual health). The unit profile indicated that there are a significant number of families and children living in poverty in Montgomery County and that chronic diseases like heart disease and cancer still persist, so programs that help families learn healthier eating habits and lifestyles on a limited budget are needed to address these issues. According to the Nutrition Journal, US adults have decreased consumption of foods from the home supply and reduced time spent cooking since 1965 (?Trends in US home food preparation and consumption: analysis of national nutrition surveys and time use studies from 1965-1966 to 2007-2008?).

Each of our Extension staff currently provide programs meeting some of these needs, but collaborative and collective efforts in these areas could provide more effective and comprehensive results for many adults, youth, and families in general. In addition, these can promote life skills development for youth and can strengthen family units as family members work together to achieve healthier lifestyles and a better quality of living.

What has been done

Our unit provided a variety of adult and youth programs related to home vegetable gardening, use of local farmers' markets, healthy cooking and food preparation, and food preservation. As an Extension team, and with collaboration with VCE volunteers, we worked with community partners to offer a variety of interdisciplinary educational programs including produce safety workshops, Christiansburg Farmacy Garden classes, youth gardening and foods clubs or camps, VCE Master?s programs outreach education, and the Montgomery County Extension Fair.

Results

The Montgomery County unit worked to meet the goals of the Unit Plan of Work with efforts and impacts at the local, statewide, and regional levels. The Montgomery County unit Agents each serve on Virginia Cooperative Extension program teams. One of the teams is particularly relevant to our plan of work (Agriculture and Enterprise Management, Marketing, and Policy), but others have implications towards our plan as well. All program teams have multiple action plans, an interdisciplinary focus, and multi-faceted goals with the potential for long-term impacts and positive change. In many cases, the work of food security and proper balanced nutrition expands beyond a single county or planning district. Often regional programing is necessary, and we worked regionally to implement programs and activities that aim to increase the access of and use of fresh produce. Our regional efforts included the Appalachian Virginia Food System Networks, and the Virginia Food Safety Team, which offers many levels of farm and produce safety to producers across SWVA. The most basic level of produce safety is the ?Enhancing Safety of Locally Grown Produce? workshop targeted to direct and farmer?s market vendors. We also offered GAP (Good Agriculture Practices) training for wholesale producers, and the new Produce Safety Alliance trainings that prepare larger producers for the federal Food Safety Moderation Act regulations. We focused most of our efforts in our own backyard, meeting the needs of our Montgomery County communities. Though we hope to develop shared metrics that will measure short and potential long-term impacts around our goal of increasing access to and use of fresh produce in Montgomery County, we concentrated most of our efforts on developing and implementing relevant programs in 2017.

Our unit was very involved in the management and programming at The Farmacy Garden in Christiansburg, which is a community garden with the focus of putting more fruits and vegetables on people?s plates. We also collaborated with the New River Valley Health District and the Virginia Family Nutrition Program to offer weekly nutritional education and monthly horticulture education at the garden. The garden is open to all low-income residents of Montgomery County, and has strong ties to the Women, Infant, and Children (WIC) department and the local Community Clinic. In 2017, the Farmacy Garden served 39 Adults and 9 Children. This effort resulted in increased access to food and educational programing for those families, a benefit they did not otherwise have, and was directly relevant to our Unit Plan of Work. In our goals to increase awareness and knowledge of how to access affordable fresh produce and how to use this produce to prepare healthy meals, we provided two youth programs including a Make it with Plants class for middle school youth and a Food Challenge program for home-school youth. The Make it with Plants class (9 participants) focused on using plants in meals (vegetables, fruits, and herbs), in clothing (textiles), and for other household needs (lotions, medicines, etc.). The Food Challenge program (32 participants) included cooking challenges focused on nutritional value and budget considerations when preparing meals.

4. Associated Knowledge Areas

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

Outcome #18

1. Outcome Measures

Limited resource farmers improve their sustainability and profitability through diversifying into alternative farm enterprises and entering new markets.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In 2017, Governor McAuliffe declared opioid addition in Virginia a public health emergency. The misuse of opioid drugs to alleviate chronic pain has led to rising death rates in the Virginia population due to unnatural causes. Recent pharmaceutical studies point to turmeric having potential to reduce opioid dependence (Hu, Huang, Szymusiak, & Liu, 2015). Additionally, food researchers attribute turmeric as a potential food source to naturally reduce inflammation contributing to chronic pain.

What has been done
Due to the emerging public interest in purchasing fresh turmeric, the VSU COA Small Fruits and Vegetable Program initiated several test plots growing and test marketing Virginia grown turmeric. On-farm demonstrations at VSU Randolph Farm determined turmeric may be successfully grown under protection of high tunnel culture. Several collaborating farmers were identified to grow and test market turmeric. To further investigate turmeric health benefits, clinical research is being conducted by a team of scientists (VSU, VT and VCU).

Results
-119 workshop participants received training on production, marketing and value added product development for turmeric
-250 turmeric plants grown and distributed to interested Virginia small farmers
-1,250 pounds fresh turmeric (5 lb/plant) harvested by participating farmers
$100,000 grant funds awarded to VSU CE & ARS to conduct clinical research related to Virginia grown turmeric health benefits
-35 small growers were trained to produce and market 20,000 ounces, or 1,250 pounds of fresh turmeric grown valued at $31,237 total direct market value ($1.56/oz. or $24.99/lb)

4. Associated Knowledge Areas

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

Outcome #19

1. Outcome Measures

Limited resource farmers improve their profitability through adoption of best management production or agribusiness practices

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1000

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

Through federal and state funding, the Virginia State University's Small Farm Program (VSU-SFOP) primary outreach efforts are to equip small farmers with the tools and skills needed for them to make informed decisions in operating successful profitable farm businesses through outreach, training and technical assistance, in a holistic manner, thereby enhancing their economic opportunities and quality of life. 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 July 2017, VSU-SFOP Conducted a progress evaluation survey of 1000 small farmers based on the above activities conducted. The results were: 77% of the respondents indicated that VSU-Small Farm Program has helped them to gain a better understanding of operating and maintaining a small farm. 65% 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. 51% 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, 510 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
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #20

1. Outcome Measures

Growing profitability for Virginia's urban agriculture businesses

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	60

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Nearly 75 percent of the U.S. population resides within 200 miles of a city representing potential customers for produce and livestock products grown on urban farms. A 2013 USDA survey of 315 U.S. urban farm producers cited their greatest training need was achieving and maintaining business profitability. The survey determined there was a lack of educational training to assist urban farm producers in being profitable.

What has been done
In 2017, VSU-CE's Sustainable Urban Agriculture (Dr. Githinji) and Marketing & Agribusiness (Dr.

Nartea) programs collaborated to develop the VSU CE Sustainable Urban Agriculture Certification Program curriculum to train 29 participants how to plan a profitable urban farm.Due to the development of the VSU-CE Sustainable Urban Agriculture Certification Program curriculum, 29 individuals attending the spring 2017 program who plan to start an urban farm in Virginia, created their personal urban farm business plan with a focus on profitability. 100% of participants agreed that prior to attending the certification program, they were unaware of how to research and write their personal urban farm business plan. 100% of participants stated that the VSU-CE business planning curriculum and training were needed to develop their own business plan. After creating their personal business plan, 100% of participants believed that the development of their personal business plan was key to their future business profitability after starting their urban farm in Virginia.

Results

Through the development of a targeted curriculum approach focused on developing profitable urban farm businesses, the VSU-CE Sustainable Urban Agriculture Certification Program is specifically addressing a pre-determined national need of educational programming for achieving and maintaining urban farm business profitability. At the end of 2017, through the conduct of both spring and fall VSU-CE Sustainable Urban Agriculture Certification Programs, 60 participants were trained in creating their personal urban farm business plan to serve as the foundation for a profitable urban farm business in Virginia. Additionally, new VSU-CE sustainable urban agriculture curriculum was developed to serve as a model for other 1890 institutions hoping to start urban agriculture certification programs in their states.

4. Associated Knowledge Areas

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

Outcome #21

1. Outcome Measures

Increasing producer sales of lamb products grown in Virginia through consumer awareness

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia producers raise over 89,000 sheep which equates to over 2.6M pounds of lamb meat (30 pound average per sheep carcass) per year. Virginia sheep producers are challenged in selling lamb meat directly to mainstream consumers who prefer chicken, beef, and pork, over lamb meat. In order for the Virginia sheep industry to be profitable in direct sales market outlets, sheep producers and VCE Agriculture and Natural Resources, and Family and Consumer agents should be aware of novel ways of educating consumers on eating Virginia grown lamb products on a regular basis as a healthy meal choice

What has been done

In 2017, VSU-CE's Small Ruminant (Dr. O'Brien) and Marketing & Agribusiness (Dr. Nartea) programs collaborated to develop educational materials to train over 120 producers, agents, and consumers on how to buy and eat more Virginia grown lamb through multiple demonstrations conducted in Roanoke and Petersburg, VA.
-50 producers and 3 VCE ANR agents learned about how to display lamb meat
-120 participants tried prepared recipes such as: Lamb Nachos, Lamb Tacos, Lamb Sausage and Gravy, and Lamb Sliders
-36 participants who did not eat lamb prior to the tasting events stated they would seek out and purchase local lamb meat and would pay up to $5.00 per pound for Virginia grown lamb
-120 participants would consider substituting local lamb for chicken, pork, and beef recipes in the future
-Conducted the first university based lamb CSA program and sold 151 VSU lamb cuts to 21 individuals at VSU

Results

-50 producers receiving marketing training believed training would increase existing farm income from lamb sales by a minimum of $500 or 10%, with a minimum increase of $25,000 total new sales from 2016 using the marketing techniques of CSA or farm stand display improvements
-VSU CSA order materials developed serve as a model for Virginia Lamb Producers
-120 program participants increased awareness of eating more local lamb

4. Associated Knowledge Areas

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

Outcome #22

1. Outcome Measures

Equipping Virginia small farmers to compete for lucrative berry markets in Mid-Atlantic US

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	55

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia small growers seek profitable crops with proven market demand. National sales of berries have skyrocketed propelled by medical research and media promotion of disease prevention benefits. With extension demonstration training, limited resource, small acreage growers may capitalize on local sales of berry crops suitable for Virginia climatic conditions.

What has been done
The VSU-COA Small Fruits and Vegetable Program has grown and identified 55 different raspberry, blackberry and blueberry varieties with high yields and quality for Virginia climates. Through $720,000 of federal and state funded grants, management techniques were developed to train VCE Extension Agents statewide on the effective production and marketing of berry crops.
What has happened in 2017?
-55 small farmers currently are growing and marketing locally produced berry crops
-37 seasonal jobs were created to support small berry industry
-279,480-one pint clamshells (9.4 MT) were produced by VSU-VCE trained participant farmers
-110 growers and consumers attended the 2017 VSU Berry and Vegetable field-day

Results
- Berries produced by VSU-VCE trained participant farmers had a total 2017 Virginia farmer's market value (VDACS, 2017) range of $1,257,660 ($4/pint) to $1,676,880 ($6/pint) or a total wholesale value of $456,000 ($1.63/pint)
- 18 former tobacco growers have converted to berry production in Southside Virginia region
- 37 seasonal jobs (picker/packer) were created in the tobacco region of Southside Virginia with minimum wage of $7.25 per hour, 29 hours per week for 12 weeks per year totaling $93,351 in gross income for seasonal farm workers.

4. Associated Knowledge Areas

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

Outcome #23

1. Outcome Measures

Adding Value through the Virginia Beef Quality Assurance Program

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
311	Animal Diseases

315	Animal Welfare/Well-Being and Protection
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #24

1. Outcome Measures

Protecting Water Resources and Chesapeake Bay Watershed with Horticultural and Crop Irrigation Strategies

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
An important component of the states' strategy to reduce nutrient loadings in the Chesapeake Bay Watershed is to encourage farmers to adopt Best Management Practices. Irrigation recycling by horticultural operations is an important practice, with potential to reduce loadings of sediment, nutrients, and pesticides. Recycling captures and reuses irrigation water containing pollutants rather than allowing it to run off into nearby water sources. Only a small fraction of horticultural operations recycles their irrigation water due to concerns about cost of the practice and increased risk of disease. Studies have shown that consumers are willing to pay premiums for horticultural plants grown with recycled water.

What has been done
Researchers at Virginia Tech compared consumer premiums for recycling with growers' costs of recycling for eight case study nurseries and two synthesized nurseries in Virginia, Maryland, and Pennsylvania. Comparison was done for three annual bedding plants (Geraniums, Petunias,Chrysanthemums) and three broadleaf evergreen plants (Azaleas, Holly, Boxwood). Growers' costs for water supply with recycled water compared to well or municipal water sources were compared. Risk of increased disease from recycled water were considered

Results
Of the eight case study nurseries and two synthesized nurseries examined, five showed increased net costs with recycling. However, out of the 60 plant-grower combinations (six types of plants times 10 case nurseries), 52 showed increased net revenues when premiums were returned to growers in the same proportion as the ratio of wholesale to retail prices. For the six

plants we considered, breakeven premiums that were required to offset increased costs of recycling averaged from one to six percent of the average wholesale price. Consumer premiums for plants grown with recycled water offer a way to promote the adoption of water recycling. Increased recycling can be a key component of a strategy to improve water quality in the Chesapeake Bay and other water bodies while maintaining the economic viability of the horticulture industry. A centralized government or industry organization may be best suited to lead the implementation of certification and labeling of plants grown with recycled water.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
601	Economics of Agricultural Production and Farm Management

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

Nothing to report.

Key Items of Evaluation

Nothing to report.

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	1%	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	10%	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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	3.5	0.0	9.9	1.0
Actual Paid	3.4	0.0	3.9	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**
90124	0	55960	173969
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
116571	0	159756	361588
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
259696	0	815391	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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	7140	2903	309	0

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

Patent Applications Submitted

Year:	2017
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	1	13	14

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
2017	29

Output #2

Output Measure

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

Year	Actual
2017	7

Output #3

Output Measure

- Number of peer reviewed journal articles.

Year	Actual
2017	12

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	Identification of a novel inhibitor against T. brucei
7	Effector-Directed Breeding for Durable, Broad-Spectrum Disease Resistance to Diseases in Soybean and Other Crops.
8	Basic Research to Enable Development of "Next-Generation" Plant Disease Resistance Genes

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
2017	0

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
Virginia Cooperative Extension 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 2014-2017 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.

USDA Knowledge Area: Topic IV Agricultural, Natural Resources, and Biological Engineering - #401 Structures, Facilities, and General Purpose Farm Supplies.

Results

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

Because of this response, Virginia Cooperative Extension provided 73 agricultural operations in Southside and Southwest Virginia access to and funding for energy audits and renewable feasibility studies; supported program participants through a cost-share program for retrofit and/or renewable systems, and delivered 30 educational programs on energy efficiency practices and technologies and uploaded supporting information to the AEEI webpage.

Between 2014 and 2017, 73 farms were accepted into the energy program. Although 6 farms withdrew, the 67 remaining farms completed an energy audit. Of those 67 farms that completed the energy audit process, 46% (n=31) implemented at least one audit recommendation and used approximately $177,000 in grant funding along with over $420,000 in individual funds. Overall, this investment resulted in a $596,828 farm energy efficiency project.

At the end of the grant cycle, 36 farms (54%) had funds remaining in their energy accounts. Virginia Cooperative Extension agents and project coordinators contacted the farms multiple times throughout the grant timeframe and encouraged each farm to utilize the resources. However, the majority of farms reported a lack of matching funds to complete any retrofits.

The Tobacco Region Revitalization Commission released a news story on the AEEI project in January 2017. Tobacco Commission Chairman, Delegate Terry Kilgore said, "This project is a good example of the positive impact the Tobacco Commission is having on our region. Helping farms remain profitable and keeping jobs in our area are important to the long term success of Southern and Southwest Virginia."

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The USDA estimates that there are 5,153 family-run poultry farms in Delaware, Maryland, Pennsylvania, Virginia, and West Virginia, with the majority located within the Chesapeake Bay watershed. As part of a larger response to achieve the nutrient reduction targets of the Chesapeake Bay TMDL, five Bay states have identified alternative uses of manure, such as bioenergy, as practices integral to the implementation of the strategies expressed in their Watershed Implementation Plans. Therefore, programming has included characterizing the on-farm performance of novel poultry litter-to-energy projects to better understand their energy, economic and environmental performance as well as farmer operational experiences in incorporating these technologies into their farms.

What has been done
Since 2011, a team has assessed six systems at five farms across the Chesapeake Bay watershed. These systems represent some of the new approaches which are needed to more efficiently address the fundamental nutrient imbalances between the US grain belt and certain animal-based agricultural systems within the Chesapeake Bay watershed. For instance, on an annual basis, one on-farm unit is capable of transforming nearly 400 tons of bulky phosphorous-rich poultry litter into approximately 60 tons of concentrated phosphorous-rich ash while also generating carbon-neutral thermal energy to provide the in-house temperature conditions to enhance bird development. On portion of this work has been to assist in project development and evaluation, this work has included securing one of the commonwealth's first Biomass Pilot Test Facility General Permits to more recently facilitating the review and approval process, based on collected performance data, for the first on-farm poultry litter-to-energy permit exemption approval letter from the Virginia Department of Environmental Quality. The appropriate application of these technologies could dramatically expand the range of opportunities to more efficiently transfer phosphorous beyond the nutrient-loaded watersheds of the Chesapeake Bay region.

Results
In one instance, during the project, this phosphorous-rich ash material was transferred out of the watershed via ash co-product sale to soybean farmers in Missouri. The application and on-farm evaluation of these innovative technologies could serve to help expand opportunities to: recycle finite phosphorous resources, reduce greenhouse gas emissions (via biomass fuel switching displacing propane, and increased efficiencies of nutrient transfer trucking logistics by concentration of phosphorous in ash co-product), respond to constraints to one of the more efficient animal-based protein production systems to feed a growing global population, and potentially help benefit Virginia poultry farmers by increasing their nutrient and energy management alternatives.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Forest coverage in Virginia occupies over 15 million acres, 60% of the state territory. This forestland is an excellent source of hardwood and softwood timber for the wood products industry. With over 1,100 wood products manufacturing establishments in the state of Virginia and more than 150,000 employees; the industry is one of the top economic, social, environmental engines in the state. It is estimated that the wood products industry contributes over $25 billion to the state?s economy.

What has been done

Extension specialists at Virginia Tech are fully engaged with the state wood products industry in providing knowledge, technical assistance, and training based on their needs. In one specialist's program, he has developed and disseminated new knowledge to increase the conversion of raw materials into value-added products by implementing modern business management practices. During 2017 he was able to participate as a speaker or organizer in 13 educational events with a participation of more than 200 attendees, representing at least 20 different wood products firms.

Results

At a production average of 5 million board feet per company per year, the specialist estimated that potential savings of at least 1% on their total production costs or about $450,000 in total per year. These potential savings can be also translated in about 4 new jobs created for the industry. In addition, the specialists was able to conduct and produced other dissemination activities such as trade journal papers and web site articles with an indirect impact of 1,500 people.

4. Associated Knowledge Areas

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

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
2017	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

Our Response:

A. 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.

B. Dr. Purwantini and I have evidences that indicate 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.

C. The results of our 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

Results

A. An manipulation of the redox control system described above would help to achieve the applied goals mentioned in the Relevance section.

B. The deazaflavin cofactor-dependent cell wall synthesis enzymes could now be targeted for developing drugs for TB.

C. 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

Identification of a novel inhibitor against T. brucei

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Rypanosoma brucei is a vector-borne parasitic disease of both clinical and veterinary importance. The drugs that are used to treat the disease in humans and in livestock are highly toxic and expensive to administer. It is estimated that the parasite is responsible for more that $5-Billion of lost agricultural productivity in 36 countries in sub-Saharan Africa.

What has been done
We have identified a new compound called AZ960 that can specifically kill the parasite and not affect mammalian cells, which represents a positive step towards developing a safer and more effective drug to cure the diseases caused by T. brucei. Our project will involves testing this compound in mouse models for its ability to cure infections in a animal mode.

Results
We expect to validate AZ960 as a small molecules that specifically targets an essential kinase in T. brucei and kills the parasite. By doing this we will have developed a first in class therapy for killing T. brucei.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Effector-Directed Breeding for Durable, Broad-Spectrum Disease Resistance to Diseases in Soybean and Other Crops.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The oomycete Phytophthora sojae causes a root and stem rot disease of cultivated soybean (Glycine max), with estimated annual costs of $1-3 billion worldwide. Every case of gene-for-gene resistance in the soybean-P. sojae pathosystem is based on recognition of virulence-promoting, secreted effectors (called RXLR proteins) by plant immune surveillance genes (called Rps genes for resistance to Phytophthora sojae). Several Rps genes are widely used in cultivated soybean, but their effectiveness is being eroded by pathogen co-evolution.

What has been done
To identify new Rps genes, we developed a strategy that combines traditional, pathogen-based screens with effectoromics, in which we deliver P. sojae RXLR effector proteins one at a time and screen for a resistance response, indicative of an Rps gene that recognizes that effector. An important component of this strategy is to identify Rps genes that recognize RxLR effectors that are important for virulence (i.e., non-redundant) and are conserved in P. sojae. We used comparative genomics, transcript profiling, and reverse genetics to identify RxLR effectors that are strongly induced during early infection, conserved amongst P. sojae isolates, and make major contributions to virulence. We also conducted pathogen-based screens of ~1100 accessions of Glycine max and its wild relative, G. soja, to identify accessions with putative novel Rps genes. We are probing these P. sojae-resistant accessions for recognition of important RxLR effectors, using a Pseudomonas-based screening system. This system delivers effectors via Type III secretion and produces a macroscopic HR for rapid throughput. We have identified accessions of G. max and G. soja that recognize important RxLR effectors, and we are now using segregating, recombinant inbred populations to map the R genes and validate their utility under field conditions.

Results
Our studies are validating the concept of using effector genes as probes to screen cultivated and wild soybean for new sources of genetic resistance against P. sojae. Because these new disease resistance genes recognize pathogen proteins that are essential for virulence and broadly conserved in diverse isolates of the pathogen, we expect these to provide durable resistance against a broad spectrum of P. sojae field isolates. Thus, these genes can be powerful tools in integrated schemes to manage soybean root and stem rot. As part of the USDA project grant that funded our work, our collaborator Nicholas Kalaitzandonakes (Univ. of Missouri) is modeling the economic impact of genetic technologies developed as part of this grant project. Preliminary results indicate that the total economic benefits from oomycete these technologies, if adopted in

the US, could yield global economic benefits in the range of $3.8 billion - $5.4 billion over the first 10 years of adoption.

A Personal Story

The effector-directed breeding approach has broad applicability to many destructive diseases. To that end, we have initiated pilot-scale projects to expand this approach to previously intractable downy mildew diseases of cucumbers and hops.

Integrated Research and Extension Involvement:

Results from the soybean project are being disseminated to the grower community via a multi-state extension effort led by Prof. Alison Robertson (Iowa State) and encompassing extension faculty from all major soybean-growing states in the Midwest. Together, this team is generating resources for soybean growers and crop professionals including: PowerPoint presentations summarizing research findings; surveys of certified crop advisors (CCAs) to ascertain awareness and management of the oomycete-soybean pathosystem; tri-fold publications for oomycetes; on-line educational modules with continuing education credits; and open-access webinars in the Plant Management Network. My group contributed a webinar explaining the basic biology behind the effector-directed breeding approach, which can be accessed via the Plant Management Network (https://www.plantmanagementnetwork.org/edcenter/seminars/soybean/OomyceteBiology/)

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources

Outcome #8

1. Outcome Measures

Basic Research to Enable Development of "Next-Generation" Plant Disease Resistance Genes

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Diseases caused by plant pathogens are a perennial threat to global food security and cost 100's of billions of dollars annually. The most cost-effective, environmentally sustainable method for disease control is to breed crops with genes for resistance to pathogens. In practice, however,

naturally occurring plant resistance genes are often quickly overcome by co-evolving pathogens. The rationale for this project is simple: If we can identify the mechanisms through which plant nutrient transport infrastructure is reprogrammed to "feed" pathogens, then we can design genetic modifications in plants to interfere with the mechanisms of reprogramming. Put another way, the ultimate aim of this project is to determine the most efficient way to cut the pathogen's supply lines in the plant, and thereby starve it to death. We believe that this approach will be more sustainable than previous genetic strategies for disease control, because it targets a fundamental requirement shared by all plant pathogens, the necessity to reprogram plant metabolism to fuel pathogen growth. However, in order to translate this concept into practice, we must acquire more baseline knowledge about how pathogens reprogram the genes that control plant nutrient transport infrastructure.

What has been done

Little is known about how eukaryotic pathogens obtain nutrients from their hosts, particularly for oomycetes. Thus, a major long-term goal is to identify plant genes/networks that are co-opted for this purpose, and understand the mechanisms that underlie this co-option. Currently, we are identifying plant transporters of important nutrients (amino acids, sugar, nitrogen, sulphur, and iron) that contribute to pathogen colonization. Then, we will investigate how they are repurposed by the pathogen and how they contribute to pathogen growth inside the plant. We have initiated projects to identify transporters of varied nutrients that are reprogrammed by oomycete pathogens. We are using Arabidopsis as a test bed for this approach, in combination with foliar and root oomycetes that efficiently cause disease in Arabidopsis. If successful in Arabidopsis, the proof-of-concept experiments can be applied to soybean and other crops that are threatened by oomycete diseases.

Results

We secured funding from the NSF, VT-ICTAS, from a VT-North Carolina State CALS collaborative program, with which we are: 1. Developing new technologies to specifically profile the transcriptomes of plant cells in which oomycetes have established feeding structure. 2. Developing new assays to track the transfer of metabolites from the plant to the oomycete. 3. Developing plant growth systems in which we can withhold specific nutrients and use transcriptomics to understand the response of the plant and the pathogen to nutrient deprivation. 4. We have used reverse genetics to identify plant transporters of amino acids, iron, and sugar that are necessary for full colonization by the pathogen. We are now initiating molecular experiments to determine whether and how they are reprogrammed by the pathogens. These tools and data will lay groundwork for a new strategy for durable, broad-spectrum resistance, in which we alter nutrient transporter genes so that they are not responsive to pathogens, thereby "cutting the supply lines." Our data provide essential foundation knowledge to test whether this approach can be applied to transporters of nutrients to provide effective resistance against oomycete pathogens. If validated, this strategy could transform breeding for disease resistance.

4. Associated Knowledge Areas

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

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

Nothing to report.

Key Items of Evaluation

Nothing to report.

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	38.4	1.0	0.0	0.0
Actual Paid	36.9	0.0	0.0	0.0
Actual Volunteer	888.0	12.0	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**
433567	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
560799	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1249348	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?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	33132	169082	5004	2818

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

Patent Applications Submitted

Year:	2017
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	25	6	31

V(F). State Defined Outputs

Output Target

Output #1

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
2017	36

Output #2

Output Measure

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

Year	Actual
2017	94

Output #3

Output Measure

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

Year	Actual
2017	22

Output #4

Output Measure

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

Output #5

Output Measure

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

Year	Actual
2017	8

Output #6

Output Measure

- Number of civic engagement events held

Year	Actual
2017	30

Output #7

Output Measure

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

Year	Actual
2017	103

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	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.
3	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.
4	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
5	Youth Civic Engagement: Increased attendance or participation in civic engagement
6	Leadership Development: Extension efforts result in increased participation by adults in community leadership roles
7	Disaster Preparedness: Increased preparedness of agricultural operations, individuals, families, businesses, and communities for natural disaster or other emergency
8	Volunteers: Extension volunteers express increased capacity
9	Water Quality: Achieving water quality goals in the Chesapeake Bay and other water estuaries by nutrient trading and resource management
10	Increasing VSU campus health and local food access through the VSU farmers market

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
2017	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 or project planning and implementation. These skill sets are essential for community leaders to support community progress. This need has been validated by the increased number of requests received for assistance in decision-making conversations 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 team of six agents and two specialists developed, coordinated, and delivered seven, 15-hour, interactive Strengthening Your Facilitation Skills (SYFS) Training workshops during 2017. Holding classes in Abingdon, Charlottesville, Lynchburg, Richmond, and Virginia Beach, our team equipped 151 individuals with the skills of facilitation. In 2017, the Virginia Chapter of the American of Planners Association approved this training for 6 CEU awards. In addition to the two-day SYFS training, SYFS was redesigned as both a 6-hour and a 60-90 minute program. The one-day training was delivered in Danville for the regional leadership program, and the 90-minute training was used with the Virginia Farm Bureau field staff.

Expanding on the facilitation training, a 6-hour Strategic & Project Planning training course was developed and taught to the Virginia Department of Social Service/AmeriCorps leadership team.

The training program was well-received by the participants and will be offered in four locations during 2018. This course incorporates the KAI assessment. Virginia Tech, University of Maine, and the University of Vermont joined forces and submitted the SYFS training to the International Association of Facilitators (IAF) https://www.iaf-world.org/site/ for national recognition. If approved as an IAF training, Virginia's trainings will be included in all IAF publicity materials.

Many times Extension is asked to have a one-on-one consultation with groups to assist in outlining discussion strategies. Responding to these requests, facilitation guidance and/or services were provided to: Fauquier Education Farm, Virginia Food Systems Council, Hampton Roads Housing Consortium, Hampton Roads Planning District Council, Virginia Farm Bureau, Danville Life Saving Crew, Virginia Farmers Market Association, Highland County Economic Development Board and The Highland Center, Upper Roanoke River Roundtable, Piedmont Community Health Coalition, Lynchburg Grows Board, Danville Habitat for Humanity Board of Directors, Averett University Alumni Board, the Virginia Christmas Tree Growers Association, the Virginia Tech Food Access network, Brunswick County's Farms to Families, the Virginia Tech MARE Center; and the Amherst and Campbell 4-H Horse Club advisors. In addition, the University of Virginia invited Extension to facilitate a discussion with researchers from universities throughout the United States on the future research agenda related to health issues in rural communities.

Results

The facilitation training delivered throughout the Commonwealth resulted in 93% of the 151 individuals reporting an increase in understanding, knowledge, and confidence in the facilitation process and discussion tools. Of those completing the training, 100% indicated that their understanding of facilitation values and principles increased, and 98.8% reported the training was either helpful or very helpful for the individuals' particular needs.

Because of the recommendations of Extension agents and Extension's respected reputation, more than 25 organizations/agencies were led through the development and/or implementation of a facilitated decision-making process in 2017 resulting in a strategic plan or a clearly defined organizational focus and/or a plan of work. Evaluation comments indicated that 100% of the groups responding ranked Extension's training and facilitation as exceptional (the highest ranking) and reported that the vision, mission, and departmental direction are clear; university service learning projects and stronger university and community relationships were established; and an organizational structure and work plan were prepared. One region expressed gratitude for "helping us get headed in the right direction. The process was very smooth and we are in much better shape now." Overall, this was the sentiment of all the groups who selected Extension as its facilitator for decision-making.

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

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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 or project planning and implementation. These skill sets are essential for community leaders to support community progress. This need has been validated by the increased number of requests received for assistance in decision-making conversations 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 team of six agents and two specialists developed, coordinated, and delivered seven, 15-hour, interactive Strengthening Your Facilitation Skills (SYFS) Training workshops during 2017. Holding classes in Abingdon, Charlottesville, Lynchburg, Richmond, and Virginia Beach, our team equipped 151 individuals with the skills of facilitation. In 2017, the Virginia Chapter of the American of Planners Association approved this training for 6 CEU awards. In addition to the two-day SYFS training, SYFS was redesigned as both a 6-hour and a 60-90 minute program. The one-day training was delivered in Danville for the regional leadership program, and the 90-minute training was used with the Virginia Farm Bureau field staff. Expanding on the facilitation training, a 6-hour Strategic Project Planning training course was developed and taught to the Virginia Department of Social Service/AmeriCorps leadership team.

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The facilitation training delivered throughout the Commonwealth resulted in 93% of the 151 individuals reporting an increase in understanding, knowledge, and confidence in the facilitation

process and discussion tools. Of those completing the training, 100% indicated that their understanding of facilitation values and principles increased, and 98.8% reported the training was either helpful or very helpful for the individuals? particular needs.

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4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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 #4

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

2. Associated Institution Types

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A community-focused food system must be cultivated and nurtured by local leadership encompassing strong community ties that are inclusive of a diversity of voices and ideas. This approach involves the establishment of collaborations and partnerships to create more resilient, vibrant, and equitable food systems and economies. Established in November 2015, a steering committee for a Community, Local, and Regional Food Systems (CLRFS) team is in the process of identifying current VCE programs and activities related to CLRFS and developing a workable and inclusive organizational structure for supporting these efforts across the Commonwealth. We have learned that this process must include identification and inclusion of our partner organizations, groups, and agencies. The steering committee is working to better inform our internal and external communities of existing food systems related programming and potential partnerships in order to create new opportunities to work toward a shared vision in Virginia.

What has been done

As a result of our 2016 Forum, we developed an action plan based on the collective impact framework that included goals to further identify VCE and partner CLRFS programming through listening sessions and increased communications and outreach. To provide more opportunities for agents to tell their local stories, we conducted nine local listening sessions (72 participants) through fall-winter 2016, which were audio recorded, and subsequently transcribed and collaboratively coded and analyzed. Findings have been shared in forms of a report and presentation to VCE. Furthermore, we enhanced communication efforts through VCE and social media outlets and formally engaged our community partners in developing a statewide CLRFS vision through a ZingTrain visioning process.

Results

The initial analysis of the data collected in our statewide listening sessions was presented at the 2017 VCE Winter Conference and revealed five key recommendations to guide future VCE CLRFS work:

- Establish VCE support of CLRFS as a statewide collaboration with regional working groups; possibly form a "center"
- Establish an online sharing network or repository of CLRFS resources
- Improve flexibility of VCE appointments to allow engagement in cross-sector work
- Enable multiple entry points for VCE and community stakeholders to engage in CLRFS work
- Establish a culture of evaluation in order to steer CLRFS work

In order to improve communications within our VCE community and with our external partners, we expanded communications through our CLRFS blog on the VCE website. With a goal of a monthly blog, our members and partners added 14 new blogs this year. In addition to these being shared on our CLRFS listserv (85 members), these blog posts, along with other relevant food systems information and activities, were shared on our CLRFS Facebook page. The reach of our Facebook page, in terms of the number of people (unique users per day) who have seen content associated with our Page, has increased from 266 in the first quarter to 4642 in the fourth quarter of 2017. The page ended the year with 145 likes compared to 99 likes in 2016.

However, to more formally engage our community partners in developing a statewide CLRFS vision and how we plan to work together, a two-day Zing Training session was co-sponsored by VCE, the Virginia Food System Council, The Agua Fund, Virginia Department of Health, Farm Credit of the Virginias, USDA-Natural Resources Conservation Service, Virginia SARE (Sustainable Agriculture Research and Education), Virginia Farm-to-Table, and Blue Ridge Community College in May 2017. This training included nearly 50 participants representing many different food systems programs across Virginia. The goal of the event and the subsequent collaboration was to create a vision of Virginia's Food System in 2027. The working draft of this Vision Statement will be shared in multiple formats and sessions during the 2018 VCE Winter Conference. As an immediate impact of the visioning training, Fauquier Fresh, Friendly City Food Cooperative, Bluestone Elementary School, and A Bowl of Good used what they learned to draft their own organizational and business visions.

Funding: Please note VCE, the Virginia Food System Council, The Agua Fund, Virginia Department of Health, Farm Credit of the Virginias, USDA-Natural Resources Conservation Service, Virginia SARE (Sustainable Agriculture Research and Education), and Virginia Farm-to-Table provided $14,700 in funds to support the visioning and bottom line organizational change training with ZingTrain.

4. Associated Knowledge Areas

KA Code	Knowledge Area
603	Market Economics

608 Community Resource Planning and Development

Outcome #5

1. Outcome Measures

Youth Civic Engagement: Increased attendance or participation in civic engagement

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Teens who have civic learning opportunities will more likely have a more positive educational path. Research indicates that individuals with higher levels of education tend to be more civically engaged. (Davila and Mora) Involving youth in civic engagement opportunities improves school success, reduces risky behavior and leads to greater civic participation in later life.

What has been done
4-H Day at the Capitol provides an opportunity for 4-H youth across the state to enhance their knowledge of governmental procedures and emphasize the importance of citizen involvement in the governmental process. Participants meet with their state legislators, observe the legislative process in action and have an opportunity to participate in educational tours learning about government and history.

Results
Over 1,000 youth and adults participated in 4-H Day at the Capitol which was the largest number of participants in the program?s history. Surveys were conducted with 107 4-H Youth from 17 different extension units. Due to inclement weather on the day of 4-H Day at the Capitol, many units did not involve youth in completing the survey. The 4-H youth completing the surveys reported they ?strongly agree? or ?agree? with the following 4-H Common Measures civic engagement (Citizenship) measures:
Ninety-nine percent of the youth completing the surveys indicated that they can make a difference in their communities through community service; 98% think they can apply knowledge in ways that solve "real life" problems through community service; 97% plan to work on projects to better their community; 96% are encouraged to volunteer more and 100% are interested in a career that helps others.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #6

1. Outcome Measures

Leadership Development: Extension efforts result in increased participation by adults in community leadership roles

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia?s poverty and unemployment rates were 11.8% and 6.9% respectively in 2014 (Census.gov). Approximately 16,235 Virginia households were at least 90 days late on their mortgage payment while another 8,946 were in foreclosure in 2014 (Federal Reserve Bank of Richmond). Of those households who had a subprime mortgage, 33 states had lower 90 day delinquency rates than Virginia, putting us in the bottom third. In addition to housing debt, Virginia ranks 8th for highest average credit card balance (bankrate.com 2015). December 16, 2015 the Federal Reserve announced an increase in the Federal Funds Rate from 0.25% to 0.50%. Within an hour of this announcement, nearly all of the large banks in the United States announced an increase of 0.25% in consumer loans while making no change to the near zero percent return on money held in saving accounts. For those with adjustable rate loans or for those who plan on taking out a loan in the future, they will now face higher interest rates, resulting in more money going towards interest. These numbers reveal the urgent need for Virginians to receive education to improve their financial literacy to improve their money management skills and make wise financial decisions. FCS agents are skilled at providing financial education to youth and adults; however, there are too few agents to meet the needs of financial education in the state of Virginia. Trained volunteers allow us to reach more participants.

What has been done
The Master Financial Education Volunteer Program curriculum covers multiple personal finance topics and provides a standardized training program across the state. Volunteers receive a minimum of 20 hours of classroom training, led by a Virginia Cooperative Extension agent. In

return, these volunteers give back a minimum of 40 hours in volunteer time.

Results

he pool of Master Financial Education Volunteers has steadily grown over the past few years. In 2017 13 VCE agents were involved in training 115 volunteers (102 of whom have graduated from the program) in 9 different cohorts. The 102 graduates compared to 188 graduates in 2016, and 100 graduates in 2015. In 2017, 353 Master Financial Education volunteers contributed 9912 hours (up from 205 MFEV and 4311 hours in 2016) equating to $296,963 ($29.96/hour). These volunteers assisted with a variety of programs such as: one-on-one financial counseling, Reality Store, Kids Marketplace, poverty simulations, youth money management workshops, Money Smarts Pay, Money Talk, just to name a few.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #7

1. Outcome Measures

Disaster Preparedness: Increased preparedness of agricultural operations, individuals, families, businesses, and communities for natural disaster or other emergency

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The vision of the Virginia MyPi program is to help youth in the Commonwealth be prepared for, and able to respond to, disasters. Youth member will be educated as to specific actions they can take before and after a disaster occurs; and prepared with knowledge and skills that will make them more resilient when faced with disasters. Children compose a special population known as a ?vulnerable group.? Such groups are more prone than others to damage, loss, suffering, injury and death in the event of a disaster. Though numerous factors can influence how vulnerable a particular child will be when faced with a potential risk, research shows that children, in general, are susceptible to three types of vulnerability during a disaster: psychological, physical and educational.

What has been done

The Virginia MyPi program is based on the National MyPi Strategy to create a nation of prepared youth. The purpose of the National Strategy is straightforward: to couple national attention on emergency and disaster preparedness with community action that focuses specifically on youth readiness for disasters and related events. The National Preparedness Goal identifies preparedness as including ?five mission areas: Prevention, Protection, Mitigation, Response, and Recovery.? The National Strategy?s envisioned alignment of attention to and action on youth preparedness can be realized with the support of organizations at the national, state and local levels that commit to engaging, empowering and building resilience in youth through preparedness education.

Results

Virginia Extension agents from five counties completed the Virginia Instructor train the trainer program in September of 2017. In 2018 each of the five counties will offer a youth program with the goal of certifying twenty five local youth in each of the pilot counties. The youth training program will include CPR & AED certification, disaster simulation, and an EM-Related career track. Additionally, awareness programs are offered in: HAM & NOAA Weather Radio, fire safety, social media & smartphone app in emergency preparedness. The youth will then be expected to work with their family to develop their emergency kit and a communication plan for their family PLUS 6 other families within their community.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #8

1. Outcome Measures

Volunteers: Extension volunteers express increased capacity

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With the expanding need of Extension programming to address community issues, a prepared volunteer base is necessary to successfully meet growing program demands. Volunteers provide an avenue for Extension programming to span a farther reach than what paid VCE faculty/staff can allow. Virginia Cooperative Extension's volunteer training programs supports researched-based programming efforts in the areas of agriculture and natural resources, family and consumer sciences, community viability, and 4-H positive youth development. Cooperative Extension volunteer programs not only expand the programming reach, but also supports the development of key leadership and interpersonal skills that includes problem-solving, communication, and working relationships (Schmeiesing, Soder, & Russel, 2005).

What has been done

In 2017, Virginia Cooperative Extension engaged over 32,000 volunteers in diverse programming efforts resulting in a reported 1,002,727 hours of service. Four Master Volunteer programs (Extension Master Gardener, Virginia Master Naturalist, Master Food Volunteers, Master Financial Educators) provide expanded education, outreach, and programming efforts. The Virginia 4-H program engaged more than 15,000 adult and teen volunteers to support the development of life skills for 240,812 Virginia youth in both rural and urban communities in 2016.

Results

- The Virginia Master Naturalist program currently has 1,845 active volunteers who reported over 136,000 service hours in 2017. These volunteers completed 26,000 hours of continuing education in 2017. Since the programâ??s inception in 2005, VMN volunteers have contributed nearly one million hours of service with a value of more than $23 million to the Commonwealth of Virginia.

- More than 780 trainees participated in Extension Master Gardener trainings and joined forces with more than 4,000 currently active Master Gardeners, 270 Emeritus, 540 Interns, and 240 Trainees.

- 296 Master Food Volunteers (MVF) reached 23,055 adults and youth statewide, during 460 educational programs, at farmers' markets, home food preservation workshops, health/wellness programs/fairs, nutrition/ healthy cooking programs and physical activity promotion programs.

-102 new Master Financial Education Volunteers were trained. In 2017, 353 Master Financial Education volunteers contributed 9912 hours, assisting with programs such as: one-on-one financial counseling, Reality Store, Kids Marketplace, poverty simulations, youth money management workshops, Money Smarts Pay, Money Talk.

- In total, the cumulative effort of Virginia Cooperative Extension volunteer contributions equated to more than $27.03 million dollars worth of value of time hours ($26.96/hour; independent sector estimate, https://independentsector.org/resource/the-value-of-volunteer-time/).

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #9

1. Outcome Measures

Water Quality: Achieving water quality goals in the Chesapeake Bay and other water estuaries by nutrient trading and resource management

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Water availability and quality is a function of both the physical environment and how humans use the water and the land within their environment (watersheds). To understand how complex ecological systems respond to changes in the environment, we must understand how humans interact with and influence these systems. Current water resources issues are the result of past decisions made within a specific cultural and historical set of circumstances. We are all invested in the future of the Chesapeake Bay and other estuaries.

What has been done
The confluence of the watershed flowing into Stroubles Creek and the Town of Blacksburg and Virginia Tech provides an incredible opportunity for research, education, and extension related to a better understanding of the dynamics of natural and human systems. Virginia Tech continued to develop and expand the Virginia Tech-StREAM Laboratory. The StREAM Lab, along 2.1-km of Stroubles Creek adjacent to campus, is a full-scale stream lab equipped with high-resolution monitoring capabilities for studying hydrologic, geomorphic, biogeochemical, ecological, and societal questions related to the management of streams and their watersheds. We also finalized a monitoring station at the Catawba Sustainability Center along Catawba Creek (within the Chesapeake Bay Watershed) to expand the reach of StREAM Lab.

Results
During 2017 we initiated four new research activities: 1) use of drone-based LIDAR for floodplain inundation modeling and visualization; 2) monitoring of macroinvertebrates; 3) monitoring of temporal dynamics of metabolism and resulting water quality; and 4) a new USDA-funded undergraduate research program "Training Future Leaders to Solve Resource Challenges at The Confluence of Water and Society." We also conducted an experimental flood along Docs Branch. One newspaper article was published about the StREAM Lab in the Collegiate Times, the Virginia Tech student newspaper. Graduate and undergraduate students utilized the StREAM Lab for their

research and supported the maintenance of the StREAM Lab. The StREAM Lab was utilized for at least eight courses across four colleges at Virginia Tech.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics

Outcome #10

1. Outcome Measures

Increasing VSU campus health and local food access through the VSU farmers market

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1101

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia State University is an 1890 Land Grant College with a long history of agricultural education. Unfortunately, many VSU employees and students may not be aware of the VSU research farm located within a 2 minute drive from campus. With public interest in eating a healthy diet of five to seven produce items daily there is a great opportunity to educate VSU campus employees and students about local farming through the conduct of a campus farmers market.

What has been done
In 2016, interested faculty and staff from the College of Agriculture responded to interest in establishing a VSU farmers market on campus.
To determine feasibility, several farmer markets were conducted at Randolph Farm to measure employee interest in buying VSU grown produce. The VSU faculty and staff responded favorably and in 2017 from June until October, the VSU Farmers Market was established on campus.
What has happened in 2017:
- 1,101 faculty and staff were made aware of the existence of the VSU farmers market and its relationship to the VSU Randolph research farm through email notifications from the Provost
- Five campus farm market sales were conducted from June to October 2017
- 350 employees and students visited or shopped at the farmers market
- 600 lbs. VSU grown vegetables and 250 lbs. VSU grown berries were sold ($3,200 market

value)
- VSU employees saved $1,600 in produce purchases (prices were sold ½ of market value)

Results
- This initiative allowed all VSU faculty and staff to become aware of and become familiar with VSU Randolph Farm and related research and extension projects. It has fostered opportunities for cross campus collaboration in the areas of teaching, research and outreach.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
801	Individual and Family Resource Management

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

Nothing to report.

Key Items of Evaluation

Nothing to report.

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%	30%
501	New and Improved Food Processing Technologies	3%	0%	10%	10%
502	New and Improved Food Products	5%	0%	10%	0%
604	Marketing and Distribution Practices	5%	0%	5%	30%
702	Requirements and Function of Nutrients and Other Food Components	5%	0%	10%	0%
703	Nutrition Education and Behavior	38%	70%	0%	30%
704	Nutrition and Hunger in the Population	2%	20%	0%	0%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%	0%	15%	0%
721	Insects and Other Pests Affecting Humans	2%	0%	20%	0%
723	Hazards to Human Health and Safety	10%	0%	15%	0%
724	Healthy Lifestyle	30%	10%	5%	0%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	18.6	4.0	39.6	3.0
Actual Paid	17.9	2.0	61.0	4.0
Actual Volunteer	2160.0	2.0	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**
1371339	189218	851500	695877
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1773762	131913	2430883	903971
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
3951589	44726	12407170	171215

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

2. Brief description of the target audience

• Children and Youth (e.g. 4-H, FFA, science museums)
• Educators (e.g. K-12, community and 4-year colleges, VCE agents)
• Managers (e.g. school food service, laboratory/technical, farm, farmers' markets, 4-H center staff, retail food)
• General public
• Farmers and agriculture production organizations
• Food processors, ingredient suppliers, packaging suppliers
• Scientists in regulatory agencies (e.g. Department of Health, VDACS, FDA, USDA, CDC)
• Healthcare practitioners (e.g. dietitians, nurses, doctors)
• Pharmaceutical and health care industries (e.g. supplement manufacturers, medical food manufacturers, pharmacists)

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	91222	61407	1390078	10175

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

Patent Applications Submitted

Year: 2017

Actual: 2

Patents listed

Nicotine nanovaccines and uses thereof (PCT/US2017/012269); Use of Oleuropein as a Treatment for Type 2 Diabetes (62/546,024)

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	10	37	47

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

Year	Actual
2017	55

Output #2

Output Measure

- Number of 4-H youth, families and communities increasing their knowledge of basic principles outlined in the Dietary Guidelines for Americans 2015

Year	Actual
2017	2127

Output #3

Output Measure

- Number of professional development sessions to VCE staff on safe food handling, healthy eating, reducing sedentary activity, and local sourcing of foods

Year	Actual
2017	12

Output #4

Output Measure

- Number of youth and families participating in sessions on the causes and effects of chronic diseases, including obesity and sedentary lifestyles.

Year	Actual
2017	27043

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increased adoption of behaviors in nutrition and physical activity to improve health and decrease chronic disease
2	Increase in number of Virginia consumers who practice safe preservation of foods at home
3	Increase in the number of Virginia produce growers who implement on-farm risk reduction practices
4	Improve food products to enhance nutrition and quality.
5	Increase in knowledge regarding how fermentation influences microbial communities and nutrients and health value of food and beverages
6	Water availability, source, and composition influences choice and behavior for hydration practices.
7	Aquaculture production and processing to yield improved production efficiency, nutrition, and economics.
8	Biological functionality of food components for combating chronic disease
9	Number of limited resource individuals, families adopting healthy lifestyle behaviors to prevent chronic disease
10	VSU sustainable and urban agriculture program enhances community access to fresh produce
11	Training tomorrow's dieticians through the VSU farm to table dietetic internship
12	Supporting local and regional food businesses to strengthen local, regional and Commonwealth economies
13	Enhancing the Safety and Regulatory Compliance of Virginia Food Industry Through Preventive Controls for Human Food Education

Outcome #1

1. Outcome Measures

Increased adoption of behaviors in nutrition and physical activity to improve health and decrease chronic disease

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Lifestyle behaviors, including diet and physical activity, impact the health of Virginians of all ages. With historically high healthcare costs and challenges providing quality health care, chronic disease prevention and management are priority issues nationally and within Virginia. In 2016, more than 1 of 4 of Virginia's youth were overweight and obese, and more than 1 in 10 adult Virginians had type 2 diabetes. To equip Virginia's families to live healthy lives, unbiased, research-based educational strategies are warranted.

Historically, VCE has delivered research-based health programming across program areas (4-H, FCS, FNP). However, more needs to be done to educate Virginians and facilitate behavior change. The FNH Program Team aims to maximize impacts by coordinating efforts of agents and specialists, prioritizing resources for evidence-based programs, and adopting common evaluation tools. Further, VCE is uniquely positioned to address these issues statewide by building local and regional coalitions and increasing public awareness.

What has been done
Educational programs teaching healthy lifestyles for chronic disease prevention and management were delivered by 58 agents, who were assisted by 296 Master Food Volunteers and 1,107 educational partners trained by FCS SNAP-Ed agents. Programs reached 50,679 Virginians in 2017. Agents received program team and specialist support for six evidence-based programs for youth and adults. In addition to the curricula prioritized by the program team, 20 agents implemented 25 other distinct curricula, developed or adapted to meet local needs, targeting healthy lifestyles in youth and adults. Details for individual programs are in specialist and agent faculty reports, and the impacts of coordinated action plan efforts are reported here.

Youth. VCE specialists supported 37 agents implementing two evidence-based programs

programs for youth: Health Rocks! and Teen Cuisine. This year, 24 new agents were trained to deliver these skill-based curricula teaching food preparation and safety. 12,422 youth participated in these programs through a variety of settings, including 4-H clubs, public schools, and other youth education sites. Program evaluations align with metrics in 4-H Common Measures and FNP federal guidelines. In addition, the 4th H for Health challenge was promoted to increase healthy lifestyle awareness within 4-H clubs. To support these efforts, faculty procured $81,000 in extramural funding.

Adults. VCE specialists supported agents implementing four evidence-based interventions for adults: Balanced Living with Diabetes, the Diabetes Prevention Program, FitEx, and L.I.F.T. These programs aimed at preventing diabetes and increasing physical activity were delivered 37 times to 433 adults, in collaboration with healthcare organizations, the YMCA, community colleges, regional food providers, faith based organizations, and the Virginia Department of Health. Coordinated efforts to encourage adoption of these programs include forming agent-specialist work groups, training agents in program delivery, and developing guidance for collecting and reporting evaluations. To improve internal awareness and knowledge among faculty and staff, the VCE Colorectal Cancer Free Zone program was implemented, the "VCE Healthy Meetings Pledge" documents were published, and the "Get the Facts" webinar series reached 108 faculty members during 9 webinars. For external awareness, the Colorectal Cancer Free Zone was extended to 5 community-based worksites reaching 136 clients; SNAP-Ed agents distributed workplace wellness resources to clients. Extramural funding to support these efforts exceeded $670,000.

Results

Healthy lifestyle program participants reported a range of improvements among youth and adults, including gains in knowledge, intentions to change behavior, and adoption of behavior change. Clinical evaluations of adults showed improved physical fitness, improved blood sugar control, and weight loss.

Balanced Living with Diabetes: In pre-post surveys, participants reported increased consumption of fruits, vegetables, and whole grains, while significantly increasing daily exercise during this 3-month program. In pre-post weight measures, more than half of participants lost an average of 4 percent body weight. Blood tests (pre-post) showed that blood sugar control improved with an average A1c reduction of 0.5 percent for participants with diabetes in poor control (A1c>7%). Research has shown that a 1% weight loss results in a 5.8% decrease in diabetes related healthcare costs, and a 1% reduction in A1c decreases health complications by 43% resulting in an average annual health cost saving of $3600 per person.

Diabetes Prevention Program: Participants lost an average of 7 percent body weight during the program, according to pre-post weight measures. Due to program success, VCE met its goal of receiving preliminary recognition by the CDC as a DPP provider, with potential for third party reimbursement.

FitEx: During the 8-week program, participants doubled the national recommendations for minimum aerobic physical activity, averaging the equivalent of walking 22 miles per week. From pre-to post- program, the percentage of participants meeting recommendations increased from 20 to 55 percent.

Health Rocks!: Among youth who completed 10 or more program hours, post-surveys showed that 9 out of 10 gained knowledge about the dangers of tobacco and other drug use. Most reported intent to avoid underage tobacco use and positive health-related behavior change in the future.

L.I.F.T.: In pre-post objective assessments, participants demonstrated significant improvements in functional fitness measures. Improved functional fitness has shown to help older adults be more self-sufficient in daily living and may influence their ability to live independently longer.

Teen Cuisine: In 4-H Common Measure post-tests evaluations, participants reported positive changes for each of the 9 metrics (range of 64 to 92 percent indicating improvements for each). Teens were asked about gains in knowledge and behavior changes, such as eating more fruits and vegetables, more whole grains, less junk food, and more water.

VCE Colon Cancer Free Zone: VCE employees showed significant increases in their confidence to get colorectal cancer screening, and positive risk reducing changes in their diet and physical activity after this program. The VCE colorectal cancer screening rate increased from 52.7 percent in 2016 to 73.3 percent in 2017. Participants in the community worksite CCFZ programs, increased their knowledge about colorectal cancer, behaviors that increase risk, and the recommendations for screening. Over 95 percent intended to change diet and physical activity behaviors and take action to be screened. If an adult colorectal cancer screening rate of 80% could be achieved, 277,000 new cases and 203,000 deaths could be averted in the U.S. by 2030.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Increase in number of Virginia consumers who practice safe preservation of foods at home

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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 foodborne illness. Foodborne 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 agent(s) in 40 County (ies) provided food preservation trainings and support in 2017. 422 individuals attended general classes on home food preservation. Some received more in-depth training including:

- 174 individuals attended hands on boiling water bath canning classes for canning high acid foods (jams, jellies, pickles, fruits, etc...).
- 41 individuals attended hands on pressure canning classes for canning low acid foods (vegetables, meats, fish, etc.).
- 69 individuals attended hands on fermentation classes
- 34 individuals attended freezing and/or dehydrating classes

Additionally, VCE provided pressure canner dial gauge inspection for 107 residents and provided one-on-one individualized home preserver support via phone/e-mail to over 300 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 95% 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. Additionally, new technology platforms were used to reach a greater audience. One agent used social media to reach over 3,600 people but participating in a Facebook! Live broadcast for the National Women's History Museum.

Use of an inaccurate gauge can lead to under processed foods which could create a botulism risk. Of those tested, 33 (31%) 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 55 million dollars.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #3

1. Outcome Measures

Increase in the number of Virginia produce growers who implement on-farm risk reduction practices

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Foodborne disease outbreaks associated with fresh produce have increased in recent years. Between 2009 and 2013, the state of Virginia averaged 302 cases of foodborne illness per year. For each confirmed case, there are an estimated 20-38 unconfirmed cases. Therefore, between 6,044 and 11,476 Virginians suffered from foodborne illness each of those years. The estimated economic loss from foodborne illness in Virginia during those years may be between 9.8 and 18.7 million dollars per year.

The Food Safety Modernization Act (FSMA) and its resulting rules were finalized in 2015, changing the regulatory environment. 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 FSMA'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 the 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
Depending on the marketplace buyer requirements of the grower, on-farm food safety education was delivered across the state of Virginia. Since 2016, "Enhancing the Safety of Locally Grown Produce," a curriculum targeting small farmer's market growers, was delivered at 15 workshops,

reaching over 300 produce growers and market managers. Additionally, at other workshops, 300+ growers were trained in navigating food safety requirements and certifications including market sector training and handling requirements to satisfy specific buyer policies.

Thirty-seven agents worked closely with specialists to conduct introductory and advanced level agent/ grower trainings statewide to increase agent capacity and the number of growers implementing on-farm and marketplace food safety principles, GAP, and/or safely operating produce packing facilities (361 growers). Additionally, 26 agents and 34 growers were mentored in the Good Agricultural Practices (GAP) certification process, with ten growers passing third party audits, thereby opening new markets for their products.

Further, 18 presentations were delivered to over 500 growers, 21 extension agents, and 45 state/county/city officials to raise awareness about the FSMA Produce Safety Rule (PSR); based on two PowerPoint presentations developed by Strawn. Twenty-two agents and specialists, and 5 VDACS Produce Safety Program representatives have attended a Produce Safety Alliance (PSA) train-the-trainer workshop allowing them to assist in training PSA Grower Training courses (several agents have trained with lead trainers Strawn and Vallotton). Additionally, two specialists (Strawn & Vallotton) became lead trainers allowing them to host PSA Grower Training courses in Virginia. Lastly, Virginia also has one certified "Train-the-Trainers" (TOTs) of the PSA curriculum (only approximately 15 TOTs in the US). The TOT (Strawn) can host PSA Train the Trainer workshops and continue to build internal (Virginia) and external (regionally and nationally) trainer capacity. As a result, 283 growers have received the PSA curriculum by attending one of the 9 PSA Grower Training courses offered in Virginia (currently the PSA curriculum is the only FDA approved training course for the FSMA PSR). One PSA Train the Trainer course was also held in Virginia. Additionally, multiple PSA trainings throughout the state are planned for 2018 (1 completed and 4 scheduled). VT/VCE has also partnered with VDACS (on a grant led by Strawn) to assist VDACS's new Produce Safety Staff including inspectors and managers in FSMA PSR education, training and outreach in Virginia. In 2017, we hosted two multiple day "educational tours" for VDACS, VCE, and FDA to visit Virginia growers and packers. These events allow all parties to interact on an informal basis and learn from each other about navigating FSMA enforcement and compliance.

In addition to trainings, a comprehensive Virginia produce food safety website (http://www.hort.vt.edu/producesafety/), housing a wealth of guidance and resources for agents, growers, and consumers, was launched in late 2017, thereby providing greater reach of our

Results

Participants were evaluated for the trainings and mentoring to determine the knowledge and intended behavior changes of participants. Those who completed evaluations said they had benefitted from the hands-on workshops, and their knowledge had increased in terms of identifying on-farm risks, implementing GAPs, and documenting food safety procedures. They also said they intended to incorporate the following practices to reduce contamination risks: (i) Providing more food safety training for workers; (ii) Testing quality of water used for irrigation; (iii) Improving handwashing and toilet facilities for workers; (iv) Improving cleaning and sanitizing methods on the farm or packing house; (v) Incorporating ways to control/monitor animals on the farm/packing/storage areas; (vi) Using safe methods (temperature control, sanitation etc.) for storage and transport of product to marketplace; and (vii) Documenting food safety practices.

Additionally, growers who took the FSMA PSR trainings completed a pre- and post-test (based on 25 questions) to determine changes in knowledge and understanding. As a result of the trainings, scores on the post-tests increased by nearly 5 points (average pre-test score 18, average post-test score 23) indicating stakeholders attending the class increased their knowledge on the FSMA

PSR.

While it is too early to measure the longer-term economic or public health impacts of this work, the efforts described herein have been critical for building capacity for VCE to deliver extension food safety programming to help meet a wide range of producer needs and challenges. This multi-leveled approach is cultivating a stronger food safety culture among produce growers in Virginia, thereby resulting in safer fresh fruits and vegetables, opening access to new markets, and complying with different regulatory guidelines.

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 #4

1. Outcome Measures

Improve food products to enhance nutrition and quality.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Celluloses are dietary fiber polymers with beneficial physiological effects including the ability to lower cholesterol, and therefore they can be used in the prevention and treatment of cardiovascular disease (CVD). It has been suggested that their ability to sequester bile salts (BS) may constitute the basis of this health benefit. However, their efficacy depends on the nature of the polymer and BS concentration. By using dietary fibers of defined structure and properties, it should be possible to get evidence on the mechanism/s of dietary fiber functionality, while potentially identifying more effective, healthier and hypocholesterolemic formulations. The design of healthier formulations to control CVD is a top priority in the US since CVD is responsible for annual deaths of 600,000 people and takes $108.9 billion/year of the US's healthcare budget. Therefore, it will have huge long-term impact on a wide range of stakeholders from consumers to policy makers.

What has been done
Synthesis of biocompatible cellulose amphiphiles allows us to vary the pendent functional groups, thus diversifying the available cellulose derivatives and facilitating detailed structure-property studies that will lead to the tailoring of the polymer to high performance in lowering cholesterol and reducing appetite. We have hydrophobically modified the cellulose and conjugated it with BS as nano-based strategy to maximize efficacy at high BS physiological concentrations and at minimum fiber concentration.

Results
Amphiphilic celluloses bearing various functional groups are excellent candidates for conjugation with BS and celluloses-BS conjugates have been successfully synthesized by the novel, mild, versatile olefin cross-metathesis (CM) chemistry. We have shown evidence of interactions taking place between BS and celluloses, which depend on the degree of hydrophobicity of the polymer

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products

Outcome #5

1. Outcome Measures

Increase in knowledge regarding how fermentation influences microbial communities and nutrients and health value of food and beverages

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Water availability, source, and composition influences choice and behavior for hydration practices.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Hydration plays a significant role in mental and physical health. Employers and educational institutions benefit from having appropriate water resources for employees and students to help facilitate optimum performance and health. Installation and use of water filling stations for reusable bottles on college campuses is increasing. Filling station conditions and reusable water bottle use may impact public health and safety due to increased water access and a risk of cross-contamination.

What has been done
We evaluated attitudes and behaviors associated with reusable water bottle use and water consumption and source. The participants were students on an academic campus who frequently carry reusable water bottles. Focus group methodologies were used.

Results
Reusable water bottle use is associated with convenience and ability to assist with staying hydrated. Attitudes about health and physiological benefits also were important. Costs, both financial and environmental, were important. The influence of peers, coaches, and parents related to student decision to use water bottles. Many students carry reusable water bottles to assist with health and hydration goals. Employers and academic institutions may benefit their employees' and students' hydration status by promoting reusable water bottle use. Providing access to clean water filling stations and drinking fountains and encouraging frequent water consumption will benefit performance.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #7

1. Outcome Measures

Aquaculture production and processing to yield improved production efficiency, nutrition, and economics.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual

2017 0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The aquaculture industry, which is a rapidly growing segment of the seafood industry, seeks to understand production efficiency, nutrition needs for aquacultured species, and value-added benefits that create economic benefits. Fish composition and sensory quality are important to consumers, influencing marketing and sales of the product. There is confusion about whether the lipid profile of tilapia is healthy.

What has been done
Commercially processed tilapia fillets were purchased from supermarkets in Florida, Texas, and Virginia. The fillets were analyzed for lipid content and fatty acid profile, based on region of origins (China, Southeast Asia, Central America, South America, and USA).

Results
The average total lipid content of tilapia fillets were slightly higher than the USDA standard of identity. Fish from Southeast Asia had the highest total lipids composition whereas lipid total in tilapia from United States was lowest. There is wide variation in fatty acid composition. In this study, about 33% of fatty acids were saturated fatty acids, 29% were monounsaturated, 25% were polyunsaturated, and nearly 7% were omega-3 fatty acids. Region of origin influenced the unsaturated fatty acid level. Products from the United States had higher omega-3 fatty acid composition than did the Asian origin. Tilapia originating from the United States may provide healthy omega-3 fatty acids in the American diet.

4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes
501	New and Improved Food Processing Technologies
502	New and Improved Food Products

Outcome #8

1. Outcome Measures

Biological functionality of food components for combating chronic disease

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Celluloses are dietary fiber polymers with beneficial physiological effects including the ability to lower cholesterol, and therefore they can be used in the prevention and treatment of cardiovascular disease (CVD). It has been suggested that their ability to sequester bile salts (BS) may constitute the basis of this health benefit. However, their efficacy depends on the nature of the polymer and BS concentration. By using dietary fibers of defined structure and properties, it should be possible to get evidence on the mechanism/s of dietary fiber functionality, while potentially identifying more effective, healthier and hypocholesterolemic formulations. The design of healthier formulations to control CVD is a top priority in the US since CVD is responsible for annual deaths of 600,000 people and takes $108.9 billion/year of the US's healthcare budget. Therefore, it will have huge long-term impact on a wide range of stakeholders from consumers to policy makers.

What has been done
Synthesis of biocompatible cellulose amphiphiles allows us to vary the pendent functional groups, thus diversifying the available cellulose derivatives and facilitating detailed structure-property studies that will lead to the tailoring of the polymer to high performance in lowering cholesterol and reducing appetite. We have hydrophobically modified the cellulose and conjugated it with BS as nano-based strategy to maximize efficacy at high BS physiological concentrations and at minimum fiber concentration.

Results
Amphiphilic celluloses bearing various functional groups are excellent candidates for conjugation with BS and celluloses-BS conjugates have been successfully synthesized by the novel, mild, versatile olefin cross-metathesis (CM) chemistry. We have shown evidence of interactions taking place between BS and celluloses, which depend on the degree of hydrophobicity of the polymer

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components

Outcome #9

1. Outcome Measures

Number of limited resource individuals, families adopting healthy lifestyle behaviors to prevent chronic disease

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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 tochange the trajectory of these statistics

What has been done
The 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 #10

1. Outcome Measures

VSU sustainable and urban agriculture program enhances community access to fresh produce

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	390

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A food desert is defined as an area where residents do not have access to affordable and nutritious food. Food deserts are often located in low income areas of a city and lack major grocery stores, farm markets, and healthy food retailers. Within food deserts, residents are considered food insecure meaning they are not sure where their food will come from. In Virginia, approximately 17.8 percent of the population lives in a food desert, many of these areas exist in Southside region, but also in the Central, West Central, and Hampton Roads regions of Virginia.

What has been done

To respond to the food desert situation the VSU Sustainable and Urban Agriculture Program conducted intensive educational activities within Virginia food desert communities to teach how to grow, prepare, and market fresh produce.

Examples of training events offered are:
- Educational workshops
- Field days
- In-service trainings
- Hands-on experiential learning
- Field demonstrations
- Community garden establishment

Results
- 150 individuals were made aware of the VSU sustainable and urban agriculture program
- 180 participants received in-class training in sustainable urban agriculture practices
- 70 participants have received hands-on training in sustainable urban agriculture
- 65 participants had a change behavior towards sustainable and urban agriculture
- 25 participants made make decisions to start urban agriculture projects
- Four community based organizations started educational gardens

Potential impacts estimated from program activities may result, such as:
- A minimum of 15% increase in vegetable production within Virginia food deserts
- A minimum 10% reduction in cost of fruits and vegetables
- A minimum 10% increase in local income for market gardens in food deserts
- A minimum 10% increase in urban food security

4. Associated Knowledge Areas

KA Code	Knowledge Area
704	Nutrition and Hunger in the Population

Outcome #11

1. Outcome Measures

Training tomorrow's dieticians through the VSU farm to table dietetic internship

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With the increase the availability of local grown foods, the majority of the nearly 90,000 registered dieticians have not received formal training in the local food supply chain from farm to table. Without raised awareness, knowledge, and skills in the availability and challenges of growing and marketing local grown foods by small farmers, practicing dieticians may have a negative influence on connected issues of food access, food security, and small farm viability by not encouraging limited resource clients and the public to purchase and include local farm foods in a recommended healthy diet.

What has been done

Since 1995, the Virginia State University (VSU) Dietetic Internship Program (VSU DI) through the leadership of the VSU Family and Consumer Services Department, has provided a 40 week intensive training for dietetic students to meet the eligibility requirements of the Accreditation Council for Education Nutrition and Dietetics (ACEND). Over time, instructors realized students would be enriched to learn about food production, since learning about how food is produced would inform future dieticians on the connection between how food is grown and human dietary health. In 2010, the VSU DI incorporated a 3-week "Farm-to-Table" rotation in cooperation with VSU Cooperative Extension Faculty and Staff. The rotation included hands on production and marketing education and activities to engage dietetic students in the challenges farmers deal with to grow and sell produce. The skills learned by dietetic students provided knowledge they will continue to use to teach consumers to purchase, prepare, and eat.

What has happened in 2017?
- Eight dietetic students have received training about production and marketing of fresh fruits and vegetables. These students participated in growing, harvesting, packaging, and marketing different crops
- Four extension bulletins on various ?Superfoods? grown at Randolph Farm were developed by the participating dietetic students
- Five healthy, low budget recipes were developed by participating dietetic students for use by low income consumers in Virginia

Results

Since 2010, 56 VSU dietetic interns have graduated as certified dieticians with the knowledge and experience of where local foods come from and the importance of including local foods in the healthy diets of clientele; 28 superfoods bulletins written; and 35 healthy, low cost recipes developed for low-income consumers in Virginia using local grown foods

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #12

1. Outcome Measures

Supporting local and regional food businesses to strengthen local, regional and Commonwealth economies

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Specialty foods continue to be a growth area in the food industry, providing opportunities to people interested in developing their own businesses and to farmers looking for alternative ways to utilize and market their crops. Start-up companies need direct assistance in complying with increased federal and state food safety regulations, and to transfer knowledge in food manufacturing. Business and marketing training is also necessary to increase the chances of success by small companies in a highly competitive niche marketplace.

What has been done
With the development of an Extension Agent network interconnected with the Food Innovations Program at the Department of Food Science at Virginia Tech, over 350 individuals within the Commonwealth interested in starting a business or already working at existing food businesses received assistance this year. The Food Innovations Program Network provided this assistance by 1)educating processors in the food safety, food processing and food regulation through local and regional workshops, conferences and short courses; 2)analyzing food products and providing recommendations for formulation and processing based on the analysis; 3)providing official documents to food processors to file with regulatory agencies; and 4)consulting with individuals or companies who need technical food processing assistance through telephone calls, emails, personal consultation and written informational sheets.

Results
In conjunction with Extension Agents across the Commonwealth, the Food Innovations Program presented five workshops that trained food entrepreneurs on starting food businesses, food safety, food processing, food quality and food regulation. In conjunction with the network of agents, over 350 individuals or companies were assisted. This translated to 136 individuals submitting 253 food products to be analyzed by the Food Innovations Program process authority

so that the food products could fall under regulatory inspection and enter into commerce as new product launches. Of these products, 89 products needed reformulation changes (assistance provided by the Food Innovations Program) for safety prior to entrance into commerce. In addition, nutritional facts labels for 117 products were generated. Although nutritional labeling is not required in most instances for start-up businesses, it provides a marketing benefit as most consumers expect nutritional information to be provided. The Food Innovations Program and Network of Agents provided these services at little or no cost. The Food Innovations Program operates on a cost recovery system, offering laboratory services at 10-20% that of industry standard. Furthermore, the network has delivered hundreds of hours of free consultation which would incur an industry consultation charge at minimum of $100/hour.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #13

1. Outcome Measures

Enhancing the Safety and Regulatory Compliance of Virginia Food Industry Through Preventive Controls for Human Food Education

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Current Good Manufacturing Practice, Hazard Analysis, and Risk-based Preventive Controls for Human Food regulation (referred to as the Preventive Controls for Human Food regulation) is intended to ensure safe manufacturing/processing, packing and holding of food products for human consumption in the United States. The regulation requires that certain activities must be completed by a "preventive controls qualified individuals" who has "successfully completed training in the development and application of risk-based preventive controls." This training that must be completed is provided through the Food Safety Preventive Controls Alliance (FSPCA), which provides a standardized curriculum for trainers to deliver to their stakeholders. Becoming an approved trainer is a significant task. Applicants must complete 30 semester hours in food

science/technology or a related field, at least five years of food safety work experience, and have participated in an instructor capacity.

What has been done

In Virginia, 4 VCE specialist applied and met the selection criteria set forth by FSPCA to become lead trainers. As a result, collectively the 4 lead trainers in VA conducted 100 hours of training for food industry and state regulators in 2017. As lead trainers for the Food Safety Preventive Controls Alliance "standardized curriculum" we conducted courses that are recognized by FDA; successfully completing this course meets the requirements for a "preventive controls qualified individual (PCQI)." In cooperation with Virginia Department of Agriculture and Consumer Services, Virginia Tech Department of Food Science and Technology applied and received grant funds through FDA allowing training to be offered to the industry participants at no charge. Preventive Controls for Human Food classes are being offered nationally from $500 to over $1000.

Results

This year 75 Virginia food processors and 29 state regulatory agents were trained and received the PCQI designation. Pre and post test showed gains in knowledge by 95.7% of the participant. Test scores increased by 14.8% for processors and 14.0% for state regulatory agents after education. Survey responses indicated that participants felt more comfortable developing plans to meet Preventive Controls Rule requirements. It is particularly important that such a large number of state regulatory agents completed the course, as they will ultimately regulate the industry in Virginia. The PCQI designation allows the food processors to be in compliance with federal Food Safety Modernization Act Preventive Control for Human Food rule. The training also allows Virginia Department of Agriculture and Consumer Services inspectors to conduct Preventive Controls inspections of Virginia food manufacturing firms.

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Government Regulations

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Nothing to report.

Key Items of Evaluation

Nothing to report.

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	39.3	2.0	59.9	1.0
Actual Paid	39.1	1.0	52.0	3.0
Actual Volunteer	5886.0	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**
1183785	90717	735043	521908
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1531170	65956	2098418	723177
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
3411141	0	10710275	370972

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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	163259	321215	129884	138575

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	27	48	75

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational programs offered.

Year	Actual
2017	720

Output #2

Output Measure

- Number of educational materials and curriculas developed

Year	Actual
2017	206

Output #3

Output Measure

- Identifiable impacts reported by agents/specialists

Year	Actual
2017	263

Output #4

Output Measure

- Number of counties where drinking water clinics are held.

Year	Actual
2017	69

Output #5

Output Measure

- Number of participants in drinking water clinics.

Year	Actual
2017	5368

Output #6

Output Measure

- Number of drinking water samples tested.

Year	Actual
2017	2178

Output #7

Output Measure

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

Year	Actual
2017	140

Output #8

Output Measure

- Number of programs for landowners which address the impacts of BMP implementation on water quality.

Year	Actual
2017	461

Output #9

Output Measure

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

Year	Actual
2017	19

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	Private water supply users who participate in drinking water clinics more effectively manage their systems
2	Private forest landowners demonstrate application of tools to improve forest health and sustainability
3	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.
4	Research climate change adaptation techniques for crop producers that will result in recommendations for the use of land management as a climate change adaptation strategy in the US and abroad.
5	Increase in the amount of cropland (acres) managed with conservation tillage production techniques
6	Increase in the amount of cropland (acres) subject to improved nutrient management technologies
7	Increase the number of residential landscapes who have adopted best management practices
8	Increase by municipalities and private industries in adoption of composting as a waste treatment technique
9	Adoption and implementation of renewable energy production of farms and local municipalities and businesses
10	Youth increase agricultural literacy
11	Management practices of forest, land, and water for conservation and protection of native and endangered aquatic fishes and land animals
12	Improvements in Cover Crop Use and Soil Health
13	Connecting young people with their drinking water through the Virginia Household Water Quality Program
14	Natural Resources and Environmental Literacy
15	Pollinator Protection Education
16	Virginia Pesticide Safety Education Program

Outcome #1

1. Outcome Measures

Private water supply users who participate in drinking water clinics more effectively manage their systems

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

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

What has been done
The Virginia 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 at least 60 counties per year. At a clinic kickoff meeting, participants receive water sampling kits and instructions. A day later, participants bring their water samples to a central location in the county. The samples are transported to Virginia Tech for analysis. Samples are analyzed for 12 chemical constituents and for the presence of total coliform and E. coli bacteria. Three weeks later, test results, an explanation of individual results, and possible solutions to water problems, including water treatment options, are discussed with clinic participants at an interpretation meeting. This interpretation meeting is a critical value-added component unique to VAHWQP drinking water clinics.

Results
Sixty-nine (69) drinking water clinics were held serving participants from 87 counties in 2017. This year, 2178 samples from private water supplies were tested. The sampled systems provide water for 5,368 Virginians. Statewide, in 2017, about 41% of all samples did not meet the EPA standard

for public systems for total coliform bacteria, 7% 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=12%), 67% of respondents reported attending the VAHWQP clinic interpretation meeting; 91% stated they believed they understood their test results. The most commonly reported recommended action taken after clinic participation was shock chlorination (19%), followed by installing or improving the function of water a treatment device (10%), pursuing additional testing (10%) and performing maintenance on well (9%). One-fifth of survey respondents shared more detailed actions they took. Nearly 80% of clinic participants report having never tested their water previously (42%) 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 2017 would be $696,960. The cost to the 2017 participants was $113,256, a cost savings of approximately 85%. In 2017, 10,135 unique visitors used VAHWQP's website, www.wellwater.bse.vt.edu.

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 #2

1. Outcome Measures

Private forest landowners demonstrate application of tools to improve forest health and sustainability

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Forestry is the third largest industry in Virginia. It contributes over $21 billion a year to the economy. Our woodlands also provide clean water and air, plant and wildlife habitat, scenery and recreational opportunities, and soil protection and enhancement. The annual value of these

environmental benefits is estimated to be $16 billion. Research into landowner decision making highlights the importance of planning, professional assistance, and peer influence to increase stewardship and sustainability while meeting society's demands for goods and services from the woods.

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

What has been done

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

Over 340 landowners have attended one of our 13 Retreats. In 2017, 61 woodland owners, who owned a total of 2,893 acres of forested land, attended a Retreat. The average ownership size of attendees was 92 acres. As a result of attending a Retreat, exit surveys indicate that 63% intended on creating a list of ownership goals, 44% intended on contacting a natural resource professional, 50% intended on obtaining a management plan, and 50% intended on implementing at least one sustainable management practice in the next year.

Attitudes also changed as a result of the Retreats, Ninety-one percent of participants agreed that working with a natural resource professional would help them achieve their ownership goals (versus 52% prior to the Retreat), and confidence to make decisions to improve woodland sustainability increased from 16% (pre) to 97% (post).

After the Retreats, we've heard back from our speakers that they have been contacted by participants, wanting to donate easements, join Tree Farm, obtain a management plan, sell timber, etc. To formally capture this anecdotal data and assess the programs mid-term outcomes, we developed and distributed a follow-up survey in the spring of 2015. This survey was sent out to landowners who attended a Retreat between 2008 and 2012. The survey was administered electronically via a Qualtrics link to all participants for whom we have a valid e-mail address; other participants received a paper survey. The survey response rate was 30%. Of the respondents, all were Virginia landowners who owned a total of 1767 wooded acres. In 2018, we will survey folks who have attended a Retreat between 2013-2015.

Results

Over 80% of the respondents had created a list of woodland ownership goals since attending a Retreat (versus 14% of the general landowner population). The most common ownership goals included:

- To protect or improve wildlife habitat (100%)
- To protect nature or biological diversity (92%)
- To enjoy beauty or scenery (85%)
- To protect water resources (85%)
- For timber products such as logs or pulpwood (85%)
- To pass land onto children or other heirs (69%)
- For recreation other than hunting (69%)

Additionally, since attending a Retreat, 81% have met with a natural resource professional (versus 19% of the general landowner population). The most commonly contacted natural resource professionals were Virginia Department of Forestry foresters (69%) and private consulting foresters (54%).

Fifty percent of Retreat participants obtained a written forest management plan. Since only 3% of landowners nationally have a written management plan, this is good news indeed.

Finally, participants implemented a number of sustainable forest management practices on their lands as a result of attending landowner weekend Retreats. These included:
- Improving wildlife habitat (63%)
- Cutting and removing trees for sale (50%)
- Eliminating or reducing invasive species (50%)
- Cutting and removing trees for own use (44%)
- Road construction or maintenance (50%)

Thirty-seven percent attended an additional landowner education program.

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

4. Associated Knowledge Areas

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

Outcome #3

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
2017	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. To achieve this goal, we propose to work broadly across common regional CB watershed physiographic gradients and dominant landuses (e.g., agriculture, forest and urban). The following goals will allow us to develop this framework based on our best current knowledge, explore the impact of CC and extreme weather events on nutrient and sediment export, and develop new modeling paradigms to improve water quality models used for management decisions.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

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

4. Associated Knowledge Areas

KA Code	Knowledge Area

112 Watershed Protection and Management

133 Pollution Prevention and Mitigation

Outcome #4

1. Outcome Measures

Research climate change adaptation techniques for crop producers that will result in recommendations for the use of land management as a climate change adaptation strategy in the US and abroad.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Orchardgrass (Dactylis glomerata L.) is one of the most valuable coo-season forage grasses in the world. Recently, however, many orchardgrass hay producers in the Mid-Atlantic U.S. have experienced a reduction in regrowth vigor and a decline in the persistence of their swards. This is a regional problem in the U.S., and not seen in other (cooler) regions of the US and Europe. Collaborating with Ben Tracy, we conducted growth chamber experiments to understand how regrowth vigor is affected by cutting height and high temperature in orchardgrass.

What has been done
Orchardgrass plants were defoliated at 7.5 or 2.5 cm cutting height at the flowering stage and regrown under 20 oC or 35 oC for up to 11 days. Stubble was harvested on days 0, 1, 3, and 11 following cutting and subjected to metabolite analysis. Photosynthetic parameters were measured in the regrown leaves on days 3 and 11, and regrowth biomass was recorded on day 11.

Results
Under optimal temperature for cool-season grasses (20oC), leaving more stubble tissue resulted in greater biomass regrowth upon defoliation. However, this advantage was cancelled under prolonged heat stress (35oC). It appears that high temperature triggers the changes in carbon and nitrogen allocation in stubble to enhance the adaptability to the stress, inhibiting the remobilization of resources necessary for the regeneration of vegetative tissues. Heat induced accumulation of carbohydrates and nitrogen compounds were more prominent in plants cut to 7.5 cm than 2.5 cm, which can explain in part the cancelation of the positive effect of high cutting height on vegetative regrowth. It is likely that greater net photosynthesis and photosystem II photochemistry in the larger stubble than the smaller under high temperature can allow the plant

to trigger the metabolic adjustment to the stress, but they do not benefit the formation of new leaves. These data suggest that cutting height management for orchardgrass benefits its regrowth vigor and productivity only when hay harvest is performed in cool seasons or in cool summer climate zones.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Increase in the amount of cropland (acres) managed with conservation tillage production techniques

2. Associated Institution Types

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Local and regional needs assessment has identified no-tillage row crop production as a best management practice to improve soil and water quality. 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.

What has been done
VCE Co-sponsored the annual Virginia No-Till Alliance annual meeting series and local and regional field days/demonstrations teaching success in reduced tillage systems.

Results

Outcomes: Increase in the information on successful implementation of no-till cropping systems available to producers and advisers; Increase in the awareness of the benefits of no-till systems; Increase in the amount of cropland (acres) managed with conservation tillage production techniques. A VT faculty member is facilitating the Virginia No-Till Alliance (Shenandoah Valley Group) with establishing a new set of long term goals. We hope to complete this process at our January 2017 board meeting. The February 2017 conference was attended by approximately 250 people. A Conservation Innovation Grant with the Virginia No-Till Alliance ended February 28, 2017. Deliverables for the third phase of the grant included a video and fact sheet on cover crops. Field days highlighting cover crops were conducted for the NRCS CIG Showcase and the NFWF annual meeting. Final planning is underway for the January 31, 2018 conference.

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 #6

1. Outcome Measures

Increase in the amount of cropland (acres) subject to improved nutrient management technologies

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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.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.

What has been done

Nutrient management topics were discussed at over 25 producer meetings and 9 field days in the previous year, with over 1600 attendees. Field scale demonstrations and research studies were conducted as part of each of these field days. Working with the Virginia Department of Conservation and Recreation two training events lasting two days each, to train stakeholders to take the certification exam were held. To reach the full breadth of clientele in the state we organized one in Richmond and one in Staunton. We also provided several events that offered Continuing Education Units for several hundred planners already certified and personnel from certified farms. At these two training events a total of 44 new nutrient management planners were trained to take the certification exam. These planners and those certified in previous years wrote over 335,000 acres of nutrient management plans for permitted farms.

Results

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 #7

1. Outcome Measures

Increase the number of residential landscapes who have adopted best management practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

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
Healthy Virginia Lawns is an ongoing partnership between Virginia Cooperative Extension and the Virginia Department of Conservation as we work to decrease run-off from urban turf. We are in our four year of this partnership and our fourth year of receiving funding to support this statewide initiative.

Results
In addition to the ten Extension units which have active local Healthy Virginia Lawns programs, here are a few other things that occurred in 2017:

We gave an oral presentation on Healthy Virginia Lawns at the 2017 Mid-Atlantic Horticulture Short Course to a crowd of more than 50 green industry practitioners.
-An advanced Master Gardener training resource was completed: Water Steward Module.
-The Water Steward Manual was used at a Water Steward Advanced Training in Loudoun County where 15 Extension MG volunteers were trained using this resource
-Support was provided to two Extension offices for HVL interns/staff
-Healthy Virginia Lawns promotional items were created and distributed at the Back to the Bay event in Fairfax County; the local Extension Agent and a total of 6 EMG volunteers staffed a booth at the event; they provided literature and promotional items to event participants; the staff and volunteers documented approximately 250 contacts. In addition to engaging the public, Extension staff and volunteers engaged with elected officials including David Bulova and Scott Lingamfelter along with local Board of Supervisor members.
-Healthy Virginia Lawns was the signature program highlighted at the EMG booth at the State Fair of Virginia for the second year in a row; HVL rain gauges were given out to the most engaged participants during the fair. EMG volunteers engaged with more than 5,500 State Fair of Virginia goers.
-Healthy Virginia Lawns was given as an oral presentation in September at the 2017 American Society for Horticultural Science national conference. More than 30 participants from all over the country heard about this program and we received inquiries from two states about it

(Pennsylvania and North Carolina). The title of the presentation was: The Nexus of Consumers, EMGs, Nutrient Management, and the Chesapeake Bay.

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Increase by municipalities and private industries in adoption of composting as a waste treatment technique

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Urban landscapes are dominated by soils of low fertility whose nutrient- and carbon-containing topsoil has often been removed and enriched with pollutants such as Pb and As. There is need for knowledge on assessing the quality of such soils, interpreting potential hazards, and remediating such disturbed soils to enable safe and healthy management, including that for food production.

What has been done
Research has been conducted, organized and presented at workshops, symposia, and field days, and articles written describing how to assess and remediate such soils. Extension specialists has provided extension agents and local government representatives with information about testing, interpreting, and remediating Pb-contaminated soils.

Results

There has been an increase in the amount of compost and other properly treated organic residuals being applied to land as a substitute for synthetic fertilizers and partially treated/stabilized wastes for urban soil renovation and stormwater management. Urban gardeners and local government representatives have the tools to properly assess and remediate contaminated and disturbed urban soils.

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land
133	Pollution Prevention and Mitigation
605	Natural Resource and Environmental Economics

Outcome #9

1. Outcome Measures

Adoption and implementation of renewable energy production of farms and local municipalities and businesses

Not Reporting on this Outcome Measure

Outcome #10

1. Outcome Measures

Youth increase agricultural literacy

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Youth and adults face limited opportunities for meaningful exposure to agricultural experiences. Meanwhile, the public receives unsubstantiated information from multiple sources, creating misunderstandings about common practices in agriculture, natural resources, and environmental

management. The public needs access to research-based information enabling them to make informed consumer decisions.

What has been done

VCE personnel devoted time to educating the public on the realities of modern agricultural practices and the science of food and fiber production. Agents and specialists facilitated structured, consumer-focused agricultural literacy events for youth and adults. The Natural Resources, Environmental, and Agricultural Literacy Education (NREALE) program team provided support to agents through a training workshop at the VCE Annual Professional Development Meeting in February of 2017 addressing field days and SOL integration for youth. The team also made training, support, and online curriculum resources available year-round to agents.

15 agents responding to an end-of-year statewide survey of agriculture, environment, and natural resources programming activities reported planning or assisting with the conduction of 8 agricultural education workshops/classes/training experiences, 7 major elementary school agriculture field day' and farm field day programs, 3 agricultural education exhibits at public events, 2 classroom agriculture programs, 2 agricultural camp experiences, and 1 major media outreach tool for facilitating agricultural education.

These programs varied in nature. For example, at county fairs, several agents interacted with the public through educational booths, presentations, and displays. One agent provided readings and follow-up discussion at several schools in their region. One agent conducted a camp introducing youth to livestock; others provided basic horticulture, food, meats, and garden exposure and training to the public, to Extension volunteers, and to youth clubs via workshops and speaking engagements. Several agents engaged in large-scale, high-quality farm field day experiences for local schools or families. A number of these interactive programs integrated SOLs into agricultural science activities in an interactive rotation format at a farm site.

Agents engaged 4-H youth in a number of these activities. Agents partnered with Master Gardeners, Master Naturalists, Soil and Water Conservation Districts, Farm Bureau, local schools, Virginia Department of Forestry, Farm Service Agency, Natural Resource Conservation Service, Virginia Department of Environmental Quality, Virginia Department of Game and Inland Fisheries, local beekeeper associations, state park officials, local park and recreation departments, local businesses, and others.

Results

The reported set of 23 consumer-focused agricultural literacy and education programs provided meaningful to exposure to agriculture for an estimated 7,667 people including 2,849 adults and 4,818 youth; the NREALE program team reasonably expects that other unreported programs facilitated by agents in Virginia could raise these totals.

VCE agents leveraged their collaborator partnerships for greater access to educational resources and enhanced the Extension footprint in local communities. While the focus of each program varied, all aimed to raise agricultural education and public knowledge of agricultural concepts. Many agents used surveys or interviews to gauge changes in knowledge about agriculture, changes in attitudes towards agriculture, and interest in agriculture. The following examples highlight several specific impacts shared by agents:

Ag Literacy Week readings and discussions: Many of the children who have been involved in this annual program for several years are able to quote lines from the previous year's book and are excited to read this year's book.

Fall harvest lessons: had a young man who had never seen or touched a pumpkin. This child and his peers had opportunities to see, touch, learn about, and cook with fall farm products and learn the parts of plants.

At a three-day Farmtastic camp centering on farm education, one very reluctant child later indicated that they wanted to become a farmer as a result of attending.

At a GMO education program, 50% of the participants left with a positive perception of this agricultural technology. When survey comments were sorted, one of three major themes was summarized in the sentiment, "This presentation expanded my understanding of GMOs in a more positive light?; want to do more research about the subject? was another key sentiment."

At a youth training led by Master Gardener Volunteers, youth provided a number of comments including, I learned that certain fruits and vegetables have to be grown in certain places.

At one school field day/tour experience, 33% of participants strongly agreed; and 67% of participants somewhat agreed; that their knowledge of agriculture increased. 50% of their teachers checked definitely yes? when asked if their students left with a better understanding of where their food comes from; the remaining 50% responded with probably yes.? At another school ag tour day, 60% of students strongly agreed? that they left with a better understanding of agriculture, and 100% of the teachers agreed? or strongly agreed? that they would utilize information they learned from the tour.
Though survey data provides important feedback measuring changes in practice, knowledge, or attitudes, stakeholder quotes provide special insight into the value that Extension programs bring to citizens of the Commonwealth. Teachers provided the following meaningful quotes about school ag field day experiences: This is such a great experience for the kids. It is wonderful to see them this excited about learning!; I just wanted to take the time to let you know how much the students from Blackstone Primary School enjoyed the Ag Day provided at [Southern Piedmont AREC]; the teachers and students come back to school very excited about all of the information that has been shared. It is always so organized and gives students the hands-on, out of the traditional classroom learning that enhances their knowledge. All of the learning stations are correlated with 3rd grade SOL standards. Many of the students have never been up close with live animals. It is always so exciting to hear the students describe what they have learned from this productive day. We would not be able to duplicate this day at the school site, so it is an important learning environment that has been created for us; This day has a huge impact on the learning of our teachers and students. They all get to see the skills they have learned in class come to life in a real world setting.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
131	Alternative Uses of Land

Outcome #11

1. Outcome Measures

Management practices of forest, land, and water for conservation and protection of native and endangered aquatic fishes and land animals

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Upstream urbanization, stream channelization, and livestock access have resulted in significant sediment loading to Stroubles Creek, which runs through the Town of Blacksburg (TOB) and Virginia Tech (VT). In 2006, the Stroubles Creek TMDL Implementation Plan identified the need for additional agricultural, stream channel, and stormwater management best management practices (BMPs) to address help reduce urban stormwater runoff and sediment loading to the creek. A team has been working since about 2009 to reduce sediment loading, control stormwater, and educate the public and students about Stroubles Creek.

What has been done
The team and volunteers have worked to install various management measures to reduce runoff and sediment to Stroubles Creek. In addition, we are monitoring the creek and several tributaries to evaluate changes in water quality over time and for use in Virginia Tech classes (>19 classes in six departments across four colleges). We have also created educational websites and are working with the Town of Blacksburg to educate the public and high school students about Stroubles Creek and the impact humans have on its quality.

Results
Since 2009, we have installed the following management practices to control stormwater and reduce sediment to Stroubles Creek: 1) Stream restoration on more than 3,000 feet of Stroubles Creek and a tributary; 2) Excluded livestock (cows) from stream access along 7,600 feet of the main stream channel and two tributaries; 3) Planted riparian forest along 7,000 feet of the main channel and two tributaries; 4) Installed 3 bioretention cells in the Foxridge Apartment complex; 5) Installed a denitrifying bioreactor (DNBR) at StREAM Lab; and 6) Installed a bioretention cell and infiltration trench at Blacksburg community center. During the spring of 2017 we planted an additional 250 feet of streamside forest along a tributary to Stroubles Creek in the Foxridge Apartment complex and moved livestock further from the stream at the Virginia Tech Beef Farm to increase the riparian forest by more nearly an acre.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #12

1. Outcome Measures

Improvements in Cover Crop Use and Soil Health

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Finding common ground can often be difficult particularly when people come from diverse backgrounds, have specific philosophic perspectives, or just see things differently. Virginia Cooperative Extension continues to work with all of agriculture to help farms of all sizes and types of operations be viable and succeed in an ever-increasing competitive marketplace. Virginia is fortunate to have 46,030 farms and more than 8.3 million acres of farmland. These farms are not one-size-fits-all but uniquely different based on place, history, and values. Virginia Cooperative Extension works to leverage agricultural and community partnerships in education and research to develop place and values-based food systems across Virginia to serve farms of all sizes. Within this context, farmers are finding common ground around topics and their mutual interest in soil health, cover cropping, and better farm-to-table connections. Farmers mutually want people to know what they are doing to protect the environment and at the same time have a better appreciation of agriculture, how food is produced, and where it comes from. Why soil and cover cropping? Soil is a critical resource to farming, conservation, and health in the 21st century. Cover cropping is a key component for building and maintaining soil health because cover crops keep the soil covered and armored; protect soil habitat; diversify food and carbon sources for soil microorganisms; enhance plant and animal communities; and encourage the growth of living roots throughout the year.

What has been done

Virginia Cooperative Extension worked collaboratively with agricultural and community partners to deliver educational and researched based programs to serve farms of all sizes and valued place and values-based food and farming systems across Virginia. To build on the growing interest in soil health, cover cropping systems, and farm-to-table connections, a multi-pronged educational program that was farmer-oriented and community-focused; highlighted and reinforced foundational principles; and demonstrated innovative practices was used to appeal to beginning

farmers, experienced farmers, crop advisors, and agency personnel. At the same time, the approach would allow farmers and food businesses to tell their stories better for customers and people better informed. To encourage the finding of common ground around soil health and farm-to-table connections, Virginia Cooperative Extension collaborated with the following organizations: Virginia Sustainable Agriculture Research and Education (SARE), USDA- Natural Resources Conservation Service, Virginia Beginning Farmer and Rancher Coalition, Virginia State University's Small Farm Outreach Program, Virginia Department of Agricultural and Consumer Services, Virginia Association for Biological Farming, Soil and Water Conservation Districts such as Shenandoah Valley and Thomas Marshall, Shenandoah Valley Produce Auction, Southern SARE, Virginia Farm Bureau Federation, Virginia Foundation for Agricultural Innovation Rural Sustainability, Farm Credit of the Virginias, Fauquier Education Farm, Virginia Forage and Grassland Council, Producer Associations, Non-Profit Organizations, and others. As part of this collaboration, Virginia Cooperative Extension and collaborators helped to present content, develop programs with mutually reinforcing themes, farmer testimonials, hands-on demonstrations and research, videos, technical materials, and stories related to soil health, cover cropping, and farm-to-table connections that would appeal to a cross-section of Virginia agronomic, horticultural, and livestock producers.

Results

Specific programmatic soil health, cover cropping, and farm to table collaboration included the 2016 and 2017 Virginia Association for Biological Farming Conference, Shenandoah Valley and Northern Piedmont Vegetable and Fruit Schools, a USDA-NRCS/Extension Soil-Health Team Building Workshop, The Community, Local, and Regional Food Systems Forum, the Southern Region Cover Crop Conference, a Rainfall Simulator Demonstration at the Shenandoah Valley Produce Auction Annual Member Meeting, A Conservation Innovation Grant Showcase, Eastern Shore Cover Crop In-Service, the 2016 - 2017 Virginia Farm to Table Conference, and the Common Ground Series of Soil Health Profiles from Virginia Farms. These collaborative programs directly reached an estimated 942 farm owners (~17, 500 acres); provided 230 Extension and USDA Professionals and mentor-leader farmers with multi-county and multi-jurisdictional responsibilities with 2,760 hours of professional development. Eleven soil health videos and technical clips were developed and published to expand the scope and outreach of training materials. This outreach method resulted in 26,834 online views of the educational videos from December 2015 to December 2017. The videos are accessible from Virginia USDA-NRCS's YouTube Channel and Virginia Cooperative Extension's Soil Health and Cover Crops topic page at: https://ext.vt.edu/agriculture/soil-health.html. An emerging outcome of the Southern Region Cover Crop Conference is that Virginia is exploring forming a Cover Crop Council and Learning Network to improve communication and coordination. To follow our ongoing work, we invite you to visit: VCE Soil Health and Cover Crops Topic Page: http://ext.vt.edu/agriculture/soil-health.html VCE Virginia Farm-to-Table Facebook Page: https://www.facebook.com/virginiafarmtotable/ VCE Cover Crops and Soil Health Blog: http://blogs.ext.vt.edu/cover-crops-soil-health/ VCE Virginia Farm-to-Table Blog: http://blogs.ext.vt.edu/farm-to-table/ Soil Health Videos and Technical Clips recently published in collaboration with USDA-NRCS: Starting with Soil at Waterpenny Farm No-Till Vegetable Experiments at Fauquier Education Farm Fine-Tuning Fertility at Potomac Vegetable Farms Experiments with No-Till Cover Crops at Potomac Vegetable Farms

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

Connecting young people with their drinking water through the Virginia Household Water Quality Program

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Nearly 1.7 million Virginians 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. 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. Based on survey and demographic information collected, we know that VAHWQP is effective in reaching older homeowners (average people per household = 2.5), but appears to be missing families with young children. Children are especially susceptible to health problems associated with certain contaminants, such as E. coli and lead. Children learn about the water cycle, water contamination and conservation at various stages in their education. These topics tie in well with the VAHWQP message, which uses conversations about family drinking water to build understanding of, and responsibility for, our shared water resources.

What has been done
A variety of efforts were conducted in 2017 to extend VAHWQP programming about groundwater protection, well and spring construction and maintenance, water testing, and water treatment, to youth audiences. Using 3-dimensional, table-top groundwater models, well component exhibits (e.g., pump, casing, sanitary well cap), and program resource materials developed specifically for youth, the VAHWQP state coordinator developed and delivered programming to about 350 students in 2017. Programming included 1 to 2-hour long interactive demonstrations to students attending VT's College of Engineering Center for the Enhancement of Engineering Diversity

(CEED) Camps. CEED camps seek to reach middle school 7th and 8th graders (Imagination) and rising high school junior and senior females interested in science and engineering (C-Tech2). Programing was also developed and delivered to students attending the Governor's School for Agriculture who selected BSE as their major. Interactive displays and conversations were used at the Kids Tech University in the spring to engage over 250 individuals about these topics. In addition, guest lectures were developed and delivered to eight sections of Giles County High School and 4 sections of Blacksburg High School's 9th grade Earth Science class. These efforts are part of a larger effort to develop a formal youth programming as part of VAHWQP. Program development focuses on delivering a STEM-compatible curriculum in science-oriented classes and through 4H clubs and/or camps.

Results

As a part of the VAHWQP youth programming development process, a STEM-oriented, school-based VAHWQP drinking water clinic program was conducted in 2017. Working with STEM-Ag, Biotechnology and Earth Science teachers from Carroll County High School these programs engaged students by offering free private water supply sample analysis to their families. Donations from Southeast Rural Community Assistance Project and Virginia Lakes and Watersheds Association, completely funded the analysis of 45 samples, a value of $2,475. This program included a field-trip to the VT campus where students gained hands-on experience in the BSE Water Quality Lab analyzing their own water samples, heard lectures about groundwater, well construction and food safety, and learned from cooperating well drillers about career opportunities in the water well industry. Participating students also learned about how to interpret their water sample analysis results and were responsible for explaining their analysis results to their families and teachers at a VAHWQP interpretation meeting. Students performed 40% better on their post-test than their pre-test. Information covered during the program directly addressed 2 Earth Science, 3 Biology and 1 Chemistry Standards of Learning. Teachers reported that students learned how to apply science concepts to real life scenarios in meaningful ways and about possible science and research career opportunities.

4. Associated Knowledge Areas

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

Outcome #14

1. Outcome Measures

Natural Resources and Environmental Literacy

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The public holds a number of misunderstandings of natural resource and environmental concepts. Misinformation on the internet exacerbates misunderstandings and increases the challenges associated with natural resources and environmental education. An increasing number of adults and young adults trust online outlets as their primary sources of information. Meanwhile, children often receive misinformation or may lack exposure to research-based information on natural resource and environment topics. In the face of these problems, youth and adults alike face dwindling opportunities for meaningful exposure to natural resource and environmental education experiences.

What has been done

VCE personnel devoted time to natural resources and environmental education. Agents and specialists facilitated structured, consumer-focused scientific literacy events for youth and adults including watershed education, Natural Resources and Environmental Education Weekend, Natural Resource camps (forestry, fishing, shooting), competitions, day camps, and other similar programs. The Natural Resources, Environmental, and Agricultural Literacy Education (NREALE) program team provided support to agents through a training workshop at the VCE Annual Professional Development Meeting in February of 2017 addressing field days and SOL integration for youth, and the team conducted a three-day in-service trainings to equip agents and teachers to deliver natural resource and environmental curriculum to youth. The team also made training, support, and online curriculum resources available year-round to agents.

12 agents responding to an end-of-year statewide survey of agriculture, environment, and natural resources programming activities reported planning or assisting with the conduction of 12 natural resource and environmental education-themed camps or day camps, 5 educational activities/presentations for youth and the public, 4 curriculum training experiences, 3 natural resource and environment-themed youth clubs, 2 educational exhibits, and 1 website education and outreach tool for the public. Holiday Lake 4-H Center also provided an annual report outlining over 10 unique natural resource and environment-centric camps and weekend activities.

These programs varied in nature. For example, camps provided opportunities for youth to learn about fishing, entomology, ornithology, wildlife science, earth science, water and stream protection, and issues and regulations affecting natural resources and conservation . Several clubs created outdoor learning experiences for members including hiking, surveying, and wildlife education. Some activities focused on water quality, pollution prevention, stream erosion, runoff, and related topics via hands-on outdoor activities and an interactive enviroscape model. Likewise, volunteers were trained to use an enviroscape model and other natural resources curriculum such as Project WET, Project Flying Wild, and Project Learning Tree as a means to increase local reach and local impacts in turn. Exhibits including a mobile aquaponics display trailer provided training in natural resource conservation and integrated topics to at schools, community colleges, and communities in several regions. An AgroEcology Hub website acted as an online clearinghouse for educators and citizens alike seeking education and learning resources in natural resource, environment, and agriculture topics.

Agents engaged 4-H youth in a number of these activities. Agents partnered with Master Gardeners, Master Naturalists, Soil and Water Conservation Districts, Farm Bureau, local

schools, Virginia Department of Forestry, Farm Service Agency, Natural Resource Conservation Service, Virginia Department of Environmental Quality, Virginia Department of Game and Inland Fisheries, local beekeeper associations, state park officials, local park and recreation departments, local businesses, and others.

Results

The reported set of 37 natural resources and environmental literacy and education programs and experiences provided meaningful to exposure to research-based information for an estimated total of 3,487 people including 804 adults and 2,683 youth; the NREALE program team reasonably expects that a number of unreported programs facilitated by agents in Virginia could raise these totals.

VCE agents leveraged their collaborator partnerships for greater access to educational resources and enhanced the Extension footprint in local communities. While the focus of each program varied, all aimed to raise education, literacy, and public knowledge of natural resources and environment topics.

Many agents used surveys or interviews to gauge changes in knowledge about agriculture, changes in attitudes towards agriculture, and interest in agriculture. The following examples highlight several specific impacts shared by agents:

After attending a hands-on streambank stabilization activity, 100% of participants indicated that they had a positive learning experience, and many indicated gaining new understanding of how valuable water resources are and indicated plans to protect and conserve water resources.

In response to club participation, one youth participant stated, "It has opened my eyes to the world around me and I love hiking and exploring!" Clubs and activities also created environments to engage adult volunteers in impacts. Reports one Master Gardener Volunteer, Great to see the kids enthusiasm. This is a way to pass on our own knowledge, skills, and enthusiasm to another generation.
At a Nature Rangers camp for 20 youth, out of 9 parents who returned a survey, 7 indicated that the educational activities rated great. One parent said, Thank you so much for offering this experience! My children had a great week!...My camper couldnt stop talking about it! Similarly, 88% of 16 participants at a youth Nature Day Camp in the Farmville region said they would recommend it to a friend. At a natural resource camp, participants indicated that they adopted a number of new and improved camping practices.

At an Urban Slobber demonstration sharing routes of pollution in waterways using a visual enviroscape model, 100% of people indicated that it changed the way they think about natural resources; participants indicated plans to adopt practices to reduce environmental impacts and water pollution.

At a fishing camp, 84% of participants agreed to prioritize protection of their fishing areas. 23 out of 32 participants indicated that they would share the information they learned, and 25 indicated that they would use the information they learned in future water recreation.
At a natural resource curriculum training program for educators, 24 of 28 adults indicated that the training changed the way they think about natural resources. At another similar training, the majority of participants indicated that they would now take their students outside more often and incorporate more nature-based learning into their classrooms.

The Mobile Aquaponics Trailer was taken to at least 6 sites for aquaponics and hydroponics teaching and demonstrations, including the Virginia State Fair. FFA students also demonstrated it

to the Commonwealth's Secretary of Agriculture and Forestry.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
124	Urban Forestry
133	Pollution Prevention and Mitigation

Outcome #15

1. Outcome Measures

Pollinator Protection Education

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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. While the entomology department addressed immediate and long-term priorities by hiring a Pollination Biology & Ecology specialist, and an Extension Apiculturist in 2016, a need existed for the education of pesticide applicators, Cooperative Extension personnel, and the general public regarding the vital role native pollinators play in Virginia ecosystems.

What has been done

As part of the Virginia Cooperative Extension (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 2017. 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 year long pollinator protection plan focus groups and advisory committee to develop a plan to mitigate the impact of pesticides on managed pollinators.

Results

In all, 7 presentations were given, directly reaching 220 people. More people were reached with the pollinator protection message through on-camera and print interviews, and via a native bee display featured in the 8 hours of the HokieBugFest (8,400 people in attendance). A demonstration solitary native bee nest was maintained at the Hahn Horticulture Garden that enabled visitors to witness the gentle nature of these valuable pollinators, and receive 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. A collaborative relationship was established with Virginia Department of Transportation (VDOT) Pollinator Habitat Program to include consideration of placing solitary bee houses, signage, and printed literature, in future rest area pollinator gardens. VDOT has a long-term plan to transform many of its rest areas into viable pollinator gardens. This collaboration will ensure that visitors will have the opportunity to pick up valuable pollinator information that is branded with both VCE and the Entomology department attributions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals

Outcome #16

1. Outcome Measures

Virginia Pesticide Safety Education Program

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

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. The Virginia Tech College of Agriculture and Life Sciences has a key initiative in agricultural and environmental sustainability and Virginia Cooperative Extension (VCE) has a planned program in pest management.

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.

Results
VCE Pesticide Safety Education enabled commercial and private pesticide applicators to be trained and certified according to state and federal requirements. We enable over 30,000 agricultural producers and pest managers to maintain certification in 27 pesticide applicator categories by using our manuals and educational programs. We enable pest managers to legally use pesticides on farms, pest management businesses, and public IPM programs throughout Virginia. Agent trainers are key to this effort. They hosted 183 trainings to recertify 2,438 private applicators in 2017. All of these individuals succeeded in renewing their pesticide applicator certification which allowed them to operate their farms in compliance with federal and state pesticide laws. Trainers were prepared to do so by attending the 25th annual Virginia Pesticide Safety Educators Webinar. About 70 VCE agents called in to participate. VTPP hosted 14 online courses to prepare applicators for certification (32 companies, 21 government entities (inc. public schools), and 7 farms (444 individuals) enrolled). We shared pesticide safety education information with 29,968 users (78,125 page views, 38,895 sessions) through VTPP.ORG. Most were from Virginia. Top metro areas included: Washington DC (Hagerstown, MD), Roanoke/Lynchburg/Blacksburg, Richmond/Petersburg, Norfolk-Portsmouth-Newport News, Charlottesville, Tri-Cities TN/VA, Harrisonburg, and Philadelphia.Tablet and phone users increased; most used desktop computers. Because of the program, risks to public health and the environment were minimized while maintaining crop protection and effective pest control.

Multi-state 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. Multi-state 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. The activity serves all who seek certification under the law.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals

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

Nothing to report.

Key Items of Evaluation

Nothing to report.

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	46.5	2.0	0.0	0.0
Actual Paid	44.7	2.0	0.0	0.0
Actual Volunteer	1902.0	38.0	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**
494462	185317	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
639563	131913	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1424818	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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	20991	20575	24246	1952

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

Patent Applications Submitted

Year:	2017
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	8	2	10

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of child care providers attending trainings.
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of parents or caregivers participating in parenting education sessions.

Year	Actual
2017	20

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	Financial Education: Increase in the number of participants who utilize spending and savings plans
3	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.
4	Stress Reduction: Increase the number of participants receiving stress reduction information.
5	Child care providers will increase their knowledge and use of practices that lead to school readiness in preschool children.
6	Dollars saved by limited resource individuals and families after attending Family Financial Management programs
7	Number of childcare providers adopting best practices in early childhood development or acquiring/maintaining business certification
8	Entrepreneurship: Increase the capacity of entrepreneurs to identify, develop, and sustain business enterprises.
9	Master Financial Education Volunteer Program Expands Impacts
10	Poverty Simulation Brings Realistic Experience to Help Community Members Understand Limited Resource Audience

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
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Virginia, there were 39 founded cases of child fatalities, 51 cases of unfounded fatalities and 31 pending cases of fatalities and a total of 120 investigations of child deaths due to suspected abuse or neglect in 2017. That same year, there were 55,258 reported cases of possible abuse/neglect. They were participants in 36,894 completed reports that were accepted by Virginia?s city and country departments of social services. There were 1,543 reports of substance-exposed newborns.

Research consistently indicates that living in poverty, unemployment, inadequate housing and conflict between parents are stressors that interfere with a parent?s ability to effectively raise children. According to the 2015 Census Bureau, 26.7% of Petersburg citizens are living below poverty level compared to Virginia's 11.3%. It further stated that poor children often suffer academically and enter adulthood lacking the skills to compete in the global labor market. Concerns about how Virginia?s families are functioning, adjusting, and adapting to these problems have economic impacts for the individual family unit and the Commonwealth as a whole. Reducing at risk behaviors while at the same time promoting resiliency within children and families is essential in reducing financial and emotional cost to families and communities (Bogenschneider, 1996).

The 2017 Virginia Child Protective Service Accountability reported 327 referrals for medical, physical & mental neglect and abuse in Petersburg. Included in these referrals are cases that are founded, invalid and are substance exposed infants. Out of the 327 referrals 138 families were assessed and there were 20 invested cases with 13 founded. This was an improvement compared to the 2016 Annual Child Protective Service Accountability report which reported Petersburg having 559 referrals for medical, physical & mental neglect and abuse in Petersburg. Out of the 559 referrals, 54 of the cases were founded.

What has been done

To identify parenting issues in Petersburg City the ELC and the agent partnered with the local Department of Social Services (DSS), school system and Ft. Lee to identify specific issues and concerns of the audience. Educational programming focused on effective parenting techniques, communication and positive discipline and included an eight week parenting workshop for DSS referred or court ordered parents, Parenting Lunch & Learn (monthly) , monthly parenting meetings. Audiences reached include, Title I parents, and preschool public education programs, workshops for teen parents at Petersburg Public Schools, workshops for grandparents raising grandchildren, and workshops for women in local battered women?s shelter care. Additionally, the agent wrote a parenting education article that was printed in the unit newsletter quarterly and mass media outreach monthly through social media. Civil rights guidelines are followed and programs are open and advertised to all, EEO/AA/ADA statements are including in all program announcements. Five Hundred Eighty Two (582) individuals participated in parenting education programs from the City of Petersburg and surrounding counties.

Results

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

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Financial Education: Increase in the number of participants who utilize spending and savings plans

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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

Response: 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.

Results

3608 adults attended one of 584 sessions led by 12 VCE Extension agents in 2017. There was a dramatic increase in planned behavior based on surveys taken prior to the adult financial literacy programs and after them: A 206% increase in those planning on writing short term financial goals. A 226% increase in those planning on writing a spending and savings plan. A 252% increase in those planning on paying themselves first for savings. A 186% increase in those planning on having an emergency fund. A 214% increase in those planning on paying down debts. A 225% increase in those planning on reviewing their credit report annually.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #3

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
2017	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 confidentâ?? 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, Real Money Real World simulations, and Reading Makes Cents. Each of these programs offers hands-on learning in an environment that correlates to Standards of Learning and educational mandates.

Results
9 FCS, 7 4H, and 1 ANR agents conducted a total of 52 Kids Marketplace simulations in 2017 with an audience of 1816 children. This represents a decrease in both the number of simulations and audience compared to 2016, but roughly no change compared to 2015. Of those surveyed, 88% of these youth learned more about using money, 95% learned the importance of giving

something up in the short run for something in the future, 90% reported that the program gave them new ideas on how to handle money in the future, and 90% plan to talk to their parents about money. 79 Agents conducted a total of 177 Reality Store programs in 2017 with an audience of 10,228 children, representing a 34% increase in the number of programs since 2016. Of those surveyed, 80% stated the program increased awareness of making smart financial decisions and 93% reported that having insurance and a savings account would help plan for emergencies. 18 Agents conducted 23 Real Money, Real World programs in 2017 with an audience of 1453 children. Of those surveyed, 94% indicated they will think through how spending impacts other opportunities and choices. Combined, 13,497 Virginia youth were reached by Extension Financial education in 2017, an increase from 10,573 in 2015, 9046 in 2014, and 7681 in 2013 but a decrease from 15,787 youth in 2016. I believe part of this year over year decrease is due to fewer agents providing me their data in 2017. 1,734 volunteers contributed 7,514 hours equating to $225,119.44 ($29.96/hour) in 2017. This compares to 2,381 volunteers and 11,346 hours in 2016, and 1015 volunteers and 5500 hours in 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being

Outcome #4

1. Outcome Measures

Stress Reduction: Increase the number of participants receiving stress reduction information.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The world is experiencing a health crisis that can cause catastrophic effects; for youth, these effects are often the result of smoking, binge drinking and illegal drug use. Virginia has not escaped this crisis, and, in many ways, the crisis is worse in our state than elsewhere. According to the Campaign for Tobacco-Free Kids (2015), 11% (47,600) of high school students reported that they currently smoke and in one year along, 9.7 million packs of cigarettes will be bought by Virginia's youth. Furthermore, 10,300 adult Virginians die every year from tobacco-related

illnesses. The Campaign for Tobacco-Free Kids also reports that smoking kills more people than alcohol, AIDS, car crashes, illegal drugs, murders, and suicides combined and thousands more die from other tobacco-related causes such as fires caused by smoking and smokeless tobacco use. In addition, $3.11 billion is spent each year in Virginia on health care costs directly caused by smoking and an additional $3.06 billion in lost
productivity is contributed to smoking related illnesses.

What has been done

In an effort to address the negative effects of drug, alcohol, and tobacco usage among youth, Virginia 4-H utilizes the Health Rocks! curriculum supported by a grant from National 4-H Council. Health Rocks! is an experiential education program facilitated by teen/adult leadership teams to help youth learn key health messages and skills, with special emphasis on prevention. This program promotes healthy lifestyle choices, targeting youth ages 10-15.</Expr1><Expr1>,
Results: In Virginia, 2,898 youth completed 10 hours or more training in Health Rocks! Of that total, 52.4% were boys and 47.6% were girls. Youth participants were from a variety of racial and ethnic groups with the majority self-reporting as being Caucasian American. Youth participants varied in grade levels (from 3rd grade to 10th grade). The majority of youth were in elementary school (53.6%), followed by middle school (45.8%) and high school (0.5%). Of these participants, the following increases in knowledge and behavior change were noted from evaluation data: Knowledge about Smoking and Other Drug Use -- After participating in the program, nine out of ten youth participants know that people who smoke or do drugs can have serious physical health (e.g. die from lung cancer), cognitive (e.g. have illusions), and relational consequences (e.g. ruined relationship with family and friends). Skills in Managing Stress, Dealing with Peer Pressure and Making Positive Decisions --
Eight out of ten youth participants in Virginia disapproved of engaging in risky behaviors related to substance use. Most of them reported intent to avoid underage tobacco use and positive health-related behavior change. They expressed confidence that they would be able to say ?no? if other people, such as their friends or peers, offered them drugs. They would not choose drinking or smoking to deal with stress. In addition, eight out of ten of youth participants were confident that they would be able to deal with stress by using stress management skills, such as talking about their problems with someone they trust. Behavior Change - After participating in the program, over 91% of youth participants demonstrated social competency, volunteerism, self-confidence and strong values. An overwhelming majority showed intent to pursue healthy behavior/avoid risky behavior. Percentage Change for all 13 Indicators -- Virginia participants reported a consistent increase in knowledge about smoking, drinking and other drug use after training. Health Rocks! training help youth learn skills in dealing with peer pressure and stress, in making good decisions, and improve their self-values.

Results

Health Rocks! was successfully completed with 348 students in Carroll County in 2017. The need for drug abuse awareness and prevention programming was presented at a Board of Supervisors meeting in Carroll County. The situation of having the most inmates in the regional jail is costing the county an unplanned budget amount of $400,000. To address the issue and curb further drug involvement from youth, I approached the Board of Supervisors and School Board about implementing the Health Rock's curriculum to students in all Carroll County schools. Students who completed the required 10 hours of instruction found much value in the lesson taught and believe that drugs and alcohol can ruin their lives.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Child care providers will increase their knowledge and use of practices that lead to school readiness in preschool children.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
During the 2015 Education Summit held by the United Way of Central Virginia, the Education Readiness Initiative was created as the first Community Impact issue. This initiative identifies four sub goals: #1 Ready Children, #2 Ready Families, #3 Ready Schools/Early Childhood Education and Care, and #4 Ready Services. During every one of the action plan meetings for each of these sub goals, the need for effective parent engagement was identified as a top priority. The leadership identified the need for less parent blaming and more opportunities for parents to become engaged in their child?s education. Recognizing that the area day care centers are often the first opportunity for children to be placed in a formal learning environment, the need for this initial interaction to be as positive as possible is extremely profound. This early interaction can essentially set the stage for positive or negative partnerships as the child progresses through the remainder of their formal education. Creating effective partnerships between parents and early educators is essential.

What has been done
At the 2016 Potpourri for Providers Early Childhood Educators Conference a lunch and learn with a book study using the book "From Parents to Partners" by Jane Keyser was held. During the lunch and learn, providers engaged in discussions centered on promoting parent involvement. Each participant was given a notebook with pre-designed activities and worksheets that were glued in to create an interactive journal. Providers were asked during the lunch and learn to reflect on their feelings about working with parents, discuss the benefits and their reservations of a family-centered partnership, and discuss the importance of two way communication. In order to receive additional credit hours, the providers were then asked to read an additional chapter in the book and either design a family-centered activity or create an environment that supports parent engagement. Plans were made to follow-up with the providers at either the annual Smart Beginnings conference in November or at a later date. At the annual Smart Beginnings

conference 12 providers earned additional credits for restructuring their classroom environment or planning a family centered event. The cost of the books was covered by a Svoboda Grant.

Results

Formal evaluations took place at the conclusion of the initial "Lunch and Learn" and revealed that providers loved the new opportunity to engage with other providers in this format. In response to the new knowledge acquired providers understood the importance of parent engagement and listed out at least two obstacles that they face in trying to establish these relationships. Sixty-eight of the providers reported that they felt confident that they now had a strategy to overcome one of their obstacles. Of the 12 providers that have completed the additional assignments, all 12 feel that the activity was extremely beneficial to their centers and all reported that they have noticed an increase in parent's interest in engagement and two-way communication. More providers will be showcasing their activities at the end of January and plans to further engage in professional learning communities will continue into the New Year. Using the new child care modules, a professional development activity has been scheduled monthly for the professional learning communities. Additional providers will have the opportunity to join these professional communities.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Dollars saved by limited resource individuals and families after attending Family Financial Management programs

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Over the years of offering both financial counseling and money management classes to low-income Arlington and Alexandria residents, staff and volunteers have found that neither approach regularly results in long-term positive behavior changes. Counseling clients typically don?t stick with the service long enough to make strides and the number of hours provided in most money

management courses are not usually sufficient to result in participants taking many concrete actions. Staff believed that a hybrid approach was in order.

What has been done

In 2013 FCS agent Jennifer Abel partnered with Arlington Partnership for Affordable Housing (APAH) to write a grant proposal in support of a new approach to financial literacy: combining financial coaching with money management classes in an intensive seven-week program. The $28,000 two-year grant was received and the program began in August 2014. The Money Smarts Pay (MSP) course is comprised of three classes, and each class is followed by a personalized, one-on-one financial coaching session. The coaching sessions reinforce the objectives learned in the class. Participants meet with the same trained volunteer financial coach for the duration of the program. The program ends with an awards ceremony. The topics of the classes are: month one: budgeting and goal setting; month two: credit and debt management; month three: saving strategies. The initial grant ended on June 30, 2016, but funding was obtained from the Foundation for Financial Planning (through our partner Bridges to Independence) and the Arlington Housing Investment Fund to continue the program through the end of June 2018. Funding has been sought for FY19 and we will have a decision in February.

Results

In 2017 we conducted six MSP courses for 39 people. Six months after the end of a course we conduct a follow up survey to see whether or not the course has made a difference in participants? lives. In 2017 follow-up surveys were completed with twelve participants. ten out of 12 say they have improved their money management skills; 75% are saving toward specific goals such as paying off credit card debt and buying a car; 75% say they have saved money since completing the course (total saved: $9,450); 75% are using a budget; 92% are paying their monthly obligations in full and on time; and six out of twelve have decreased their overall debt (four of the others had no debt to begin with). The total amount of debt that participants have paid off is $8,500.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #7

1. Outcome Measures

Number of childcare providers adopting best practices in early childhood development or acquiring/maintaining business certification

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There is a growing interest in the role that entrepreneurship can play as a catalyst to achieve economic and social development objectives, including growth, innovation, employment, and equity.

What has been done
VCE has responded to entrepreneurship training needs in the following ways:
-Managed the SourceLinkVirginia.org entrepreneurship support website.
-Authored over 20 blog posts on entrepreneurship and promoted new via related Social Media (Facebook/Twitter) feeds.
-Served on 2 gubernatorial councils on small business and social entrepreneurship, and moderated panels at 3 statewide conferences.
-Provided technical assistance to 7 local and regional economic development groups.
-Conducted 2 in-service trainings on Navigating Entrepreneurship Resources in Virginia. Served on Advisory Committees for the VT Dept. of AgEcon new ?Food as a Business? program and VSU Extension?s new ?Small Farm Resource Center? project. Served as an advisor to VT Office of Econ. Dev. Kauffmann Entrepreneurship Ecosystem Project.

Results
Results of these efforts include:
-Over 4,400 Virginia?s accessed information to help them start, run and grow their businesses.
-Over 400 page-views of blog posts. Over 375 Twitter followers with over 52,000 Impressions. Over 230 Facebook likes with a Post Reach of nearly 3,400.
-Provided information and advice to over 100 Virginia practitioners interested in improving economies through entrepreneurship programming.

-Over 60 Virginia practitioners received training and technical assistance in building entrepreneurship-based economic development programming.
-Agents and Specialists increased their knowledge of the variety of small business development resources available in Virginia. New agribusiness development programs incorporated information about generalist resources into their efforts. University economic development office incorporated lessons-learned from VCE entrepreneurship efforts into their findings.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #9

1. Outcome Measures

Master Financial Education Volunteer Program Expands Impacts

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia's poverty and unemployment rates were 11.8% and 6.9% respectively in 2014 (Census.gov). Approximately 16,235 Virginia households were at least 90 days late on their mortgage payment while another 8,946 were in foreclosure in 2014 (Federal Reserve Bank of Richmond). Of those households who had a subprime mortgage, 33 states had lower 90 day delinquency rates than Virginia, putting us in the bottom third. In addition to housing debt, Virginia ranks 8th for highest average credit card balance (bankrate.com 2015). December 16, 2015 the Federal Reserve announced an increase in the Federal Funds Rate from 0.25% to 0.50%. Within an hour of this announcement, nearly all of the large banks in the United States announced an increase of 0.25% in consumer loans while making no change to the near zero percent return on money held in saving accounts. For those with adjustable rate loans or for those who plan on taking out a loan in the future, they will now face higher interest rates, resulting in more money going towards interest. These numbers reveal the urgent need for Virginians to receive education to improve their financial literacy to improve their money management skills and make wise financial decisions. FCS agents are skilled at providing financial education to youth and adults; however, there are too few agents to meet the needs of financial education in the state of Virginia.

volunteers allow us to reach more participants.

What has been done

The Master Financial Education Volunteer Program curriculum covers multiple personal finance topics and provides a standardized training program across the state. Volunteers receive a minimum of 20 hours of classroom training, led by a Virginia Cooperative Extension agent. In return, these volunteers give back a minimum of 40 hours in volunteer time.

Results

The pool of Master Financial Education Volunteers has steadily grown over the past few years. In 2017 13 VCE agents were involved in training 115 volunteers (102 of whom have graduated from the program) in 9 different cohorts. The 102 graduates compared to 188 graduates in 2016, and 100 graduates in 2015. In 2017, 353 Master Financial Education volunteers contributed 9912 hours (up from 205 MFEV and 4311 hours in 2016) equating to $296,963 ($29.96/hour). These volunteers assisted with a variety of programs such as: one-on-one financial counseling, Reality Store, Kids Marketplace, poverty simulations, youth money management workshops, Money Smarts Pay, Money Talk, just to name a few.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being

Outcome #10

1. Outcome Measures

Poverty Simulation Brings Realistic Experience to Help Community Members Understand Limited Resource Audience

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Poverty impacted 1 in every 10 Virginia residents (11.8%) in 2014 (census.gov). The federal guidelines for determining the poverty threshold is dependent on income as well as the number of people living in the household. For example, in 2015, a family of one is considered under the poverty level if his or her income is less than $11,770 while a family of four is under the poverty level if household income is less than $24,250 (Federal Register, 2015). Besides the negative financial aspects of being impoverished, it is also linked to poor nutrition and health, emotional distress, teen pregnancy, and academic failure (vaperforms.virginia.gov). There are drastic differences in poverty rates across the state of Virginia, with the northern region having the lowest rates (6.6%) while the south (20.2%) and southwest (18.6%) regions having the highest.

What has been done

Virginia Cooperative Extension's Family and Consumer Sciences (FCS) and 4H Agents hosted Poverty Simulations to help individuals understand the real-life situations that families living in or near poverty must experience daily. The simulation gave participants a first-hand knowledge of the decisions these families have to make, and their fears and frustrations. In the simulation, 44 to 82 participants assume the roles of up to 26 different a low-income families living on a limited budget. Some families were newly unemployed, some were recently deserted by the primary wage earner, some were homeless, and others were recipients of TANF (temporary assistance for needy families), either with or without additional earned income. Still others were senior citizens receiving disability or retirement checks or grandparents raising their grandchildren. The task of the families? was to provide for basic necessities and shelter during the course of four 15-minute weeks. The major strategy of the simulation is to allow participants the opportunity to interact with resources that would be found in low-income communities such as; a bank, childcare center, grocery store, payday/car title lender, employer, utility company, pawn broker, social service agency, faith-based agency, mortgage company, school, and community health care facility.

Results

11 VCE agents conducted 13 poverty simulations reaching 790 participants in 2017. 208 volunteers contributed 741 hours in volunteer time equaling $22,200.36 ($29.96/hr). Of those surveyed: 93% stated that the simulation changed their views and increased empathy toward those facing poverty, 93% changed their view regarding financial pressure of those facing poverty, 95% changed their views regarding the impact of social services and other resources available for those facing poverty, and 99% changed their views regarding the emotional stress of those facing poverty.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Nothing to report.

Key Items of Evaluation

Nothing to report.

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	100.7	3.0	0.0	0.0
Actual Paid	83.8	1.0	0.0	0.0
Actual Volunteer	15515.0	6.0	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**
2659862	87788	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
3440406	65956	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
7664539	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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	128576	876906	807212	891640

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	18	6	24

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
2017	1821

Output #2

Output Measure

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

Year	Actual
2017	10

Output #3

Output Measure

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

Year	Actual
2017	200355

Output #4

Output Measure

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

Year	Actual
2017	101794

Output #5

Output Measure

- Number of youth engaged in Citizenship.

Year	Actual
2017	105895

Output #6

Output Measure

- Number of youth engaged in Healthy Lifestyles.

Year	Actual
2017	60397

Output #7

Output Measure

- Total number of adults volunteers.

Year	Actual
2017	11183

Output #8

Output Measure

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

Year	Actual
2017	296

Output #9

Output Measure

- Total number of youth volunteers.

Year	Actual
2017	3717

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	4-H Camping - Percentage 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 - Percentage of youth participating as volunteers and through community service that demonstrate teamwork skills and community commitment.
3	4-H Foods, Nutrition and Health - Percentage of 4-H youth participating in foods, nutrition, and health programs that increase knowledge, attitudes, skills, and aspirations to promote optimal physical, social, and emotional health habits.
4	4-H Science, Engineering and Technology - Percentage of 4-H youth that demonstrate increased knowledge, skills, aspirations, and attitudes in STEM programming.
5	4-H Adult Leaders - Percentage of adult 4-H volunteers participating in leadership and volunteer development who indicate increased knowledge and skill development in implementing 4-H programming.
6	Number of limited resource youth trained in STEAM content related to environmental education and agriculture.
7	Percentage of youth who make positive choices.
8	Percentage of youth who effectively communicate.
9	Youth Meat Quality Assurance Training Helps Build Better Youth and Develops Youth Agvocates
10	Using Bugs to Interest Kids in STEM Fields

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Growing True Leaders Campaign was launched by the National 4-H Council in 2016. As stated in the Council?s 2016 Annual Report1, ?89% of business leaders are concerned that college graduates do not have the necessary skills for success. Only one in three young people say they are ready today with the skills they need to lead.? The business community recognizes the need for good communication, problem solving, team building, dependability, and the initiative to get the job done2. These skill sets are also necessary for successful leadership in our camping program and are targeted in many of our training sessions for teens.

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.

What has been done
Virginia 4-H is working to assess the extent to which the experience as a 4-H camp teen counselor has assisted in the development of leadership skills as they relate to future academic and career success. Anecdotally we see and hear the positive results related to the leadership roles teens have had the opportunity to participate in as part of our camping programs. The 4-H Positive Youth Development Program Team has developed a quantitative and qualitative evaluation to help assess if we are reaching specific outcomes related to leadership skills and what impacts those outcomes may have in the future for these teens. The evaluation instrument, a post camp survey, was administered at all six Virginia 4-H Educational Centers during the 2017 camping season.

Results

Eight hundred sixty three (863) teens from the six 4-H educational centers completed the post camp survey. Of these respondents, 674 (78%) stated they participated in Virginia's Counselor in Training (CIT) program before becoming teen leaders at camp. This pre-leadership program is designed to provide youth with understanding, self-confidence, knowledge, and guidance on transitioning from camper to teen. Survey results indicated that 93% of the 674 participants felt better prepared to be teen leaders after completing the CIT course.

Once in the program, teens are expected to participate in a minimum of 40 hours of training and be able to demonstrate the skills learned during the camping program. When teens were asked how often they demonstrated the following leadership skills before and after serving at camp the following depicts their responses:

	Before	After	Percent Increase
Listening	51%	74%	+45%
Teamwork	45%	69%	+53%
Setting Goals	35%	55%	+57%
Time Management	36%	63%	+75%
Stepping up as a Leader	39%	67%	+72%
Active in my Community	42%	62%	+48%

With an average 58%+ gain in perceived skills after camp as reported by respondents, it is evident that teens feel their skills as leaders have been influenced by the leadership roles given them at camp. When teens were asked what skills they feel will assist them in future endeavors, the top answers were problem solving, teamwork, and learning to communicate effectively. When asked how they will use what they have learned as a teen counselor in the future, teens most indicated they would use acquired skills for future employment, community involvement and in daily life.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual

2017	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 #3

1. Outcome Measures

4-H Foods, Nutrition and Health - Percentage of 4-H youth participating in foods, nutrition, and health programs that increase knowledge, attitudes, skills, and aspirations to promote optimal physical, social, and emotional health habits.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Obesity among adolescents is one the most important predictors of adult obesity (Dietz & Gortmaker, 2001) and a risk factor for non-communicable diseases (Franks, Hanson, Knowlder, Sievers, Bennett, & Looker, 2010). Based on 2011-2012 data, 20.5% of youth ages 12-19 years old were considered obese, with higher levels among non-Hispanic black and Hispanic youth (Ogden, Carroll, Kit, & Flegal, 2014). Furthermore, Virginia ranked 23rd in the country for percentage of overweight or obese children after finding that 30% of Virginia?s 10 to 17 year olds were found to be overweight or obese. Many youth today have diets that lack fresh fruits and vegetables and currently exceed recommendations for saturated fat and added sugars (Story et al., 2009). Research has shown that healthy eating and physical activity can lower the risk of becoming obese and developing obesity related diseases. Additionally, self-reported cooking ability has been shown to have a positive association with positive nutritional indicators, such as meeting fruit and vegetable recommendations (Utter, Denny, Lucassen, & Dyson, 2015). Cooking skills for adolescents are especially important as foods prepared out of the home are of lower nutritional quality than those prepared in the home and have been associated with increased energy intake, leading to weight gain and increased prevalence of obesity (Poti & Popkin, 2011, Thompson et al., 2004). Based on recommendations to increase healthy food and beverage availability to address adolescent obesity (Brener et al., 2013; Glickman, Parker, Sim, Del Valle Cook, & Miller, 2012) and the need to provide adolescents with knowledge to safely prepare nutritious meals (Lichenstein & Ludwig, 2010), an effective skills-based curriculum for teens is needed.

What has been done
In Virginia, many Family Nutrition Program Assistants, as well as 4-H and FCS Agents lead healthy living programs striving to educate today?s adolescents on healthy, inexpensive food preparation techniques to use at home. The Teen Cuisine skill-based curriculum combines

obesity prevention education with food preparation and culinary skills in addition to kitchen safety targeted at 12-18 year olds. The six 90-minute lessons are focused on key components of the Dietary Guideline for Americans, including MyPlate, food labels, sources of fat, whole grains, and nutritious snacks. Since 2013, Virginia 4-H has received a yearly grant funded by National 4-H Council and the Walmart Foundation to provide training and resources to 4-H Agents, Family and Consumer Science Agents, and Food and Nutrition Program Assistants to implement Teen Cuisine and other healthy living programs. In 2016, Virginia 4-H was awarded the grant for the fourth year in the amount of $68,000. Programming for that grant cycle started in September 2016 and concluded in August 2017. In September the grant was renewed for $81,000 and programming began that will last through August 2018.

Results

Through interdisciplinary programming (FNP, 4-H, and FCS) a diverse group of over 9,500 youth between the ages of 11-18 participated in Teen Cuisine in 2017. Students completed either a pre-post evaluation, as required for the Family Nutrition Program staff, or the 4-H Common Measures Healthy Living post-test as required by the Youth Voice Youth Choice grant. 1,330 Common Measure evaluations were completed for the 6th-12th grade participants.

As a result, based on the Common Measure post-tests evaluations, teen participants reported a variety of positive impacts.
-92% indicated that as a result of Teen Cuisine they learned about healthy food choices and the importance of nutrition in planning meals and snacks.
-74% indicated that as a result of Teen Cuisine they are making healthier food choices, like eating more fruits and vegetables, eating more whole grains, eating less junk food, and consuming more water.
-69% report encouraging their family to eat meals together.
Compared to last year?s results 8% more students report consuming less junk food. Other results are comparable to previous year?s data.
This translated into:
-83% report that they ate more fruits and vegetables (up 1%)
-69% report that they ate more whole grains (down 2%)
-64% report that they ate less junk food (up 8%)
-86% report that they ate more water (same)
In terms of food preparation and cooking skills:
-91% reported improved knife skills (down 1%)
-79% reported that they learned how to measure when following a recipe
-73% indicated that they cooked more (down 2%)
-93% reported that they washed hands before they cooked (down 1%)

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #4

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The frequency and diversity of Virginia 4-H STEM programs has increased in recent years. Program descriptions and county-level reporting indicate that these programs are reaching a large number of youth. A total of 97,045 youth (48% of enrollment) completed at least one STEM project in 2014-2015. While some of these programs have been disseminated and supported at the state level (e.g. Maker), many have developed at the local level due to youth and volunteer interest. In 2016, the STEM subteam of the Positive Youth Development Program Team developed and administered a STEM program survey for 4-H agents, volunteer leaders, and other extension personnel involved in STEM-related youth programs. 27 existing STEM programs were reported on by a total of 18 VCE agents, specialists, and volunteers. Results indicate that Virginia has a wide variety of STEM offerings for youth spanning multiple delivery modes. Of the programs reported on, 42% are in-school enrichment programs, 22% are afterschool programs, 14% are programs held at camp, 11% are special interest clubs, and 11% are traditional 4-H clubs. STEM programs are in a diverse range of content areas, including: archery, animal science, electricity, robotics, rocketry, scientific investigations, and environmental/ water education. Additionally, a number of long-standing 4-H programs have the potential to support contextualized STEM learning. A consistent method for evaluating STEM outcomes for youth involved in these programs does not exist for Virginia 4-H.

What has been done
In Fall 2016, the STEM subteam met to plan for how the results of the survey may be used to guide VCE STEM programming into the future. The team identified five â??theme areasâ?? for VCE programs that could encompass all of the different types of STEM-related programs offered. The themes are phrased in terms of what skills and abilities are promoted by these programs. A particular program could address more than one, but should fit within at least one theme.

The purpose of developing these themes was to help organize our efforts moving forward while at the same time helping VCE prioritize these outcomes for youth over the specific content they may be using as a vehicle for developing these skills and abilities. These themes should be considered alongside overarching skills and dispositions that any STEM-related program can develop. These may include: self-efficacy for STEM, STEM-related career aspirations, curiosity, problem solving, critical thinking, and intellectual risk taking.

The five theme areas are:
-Creativity
-Design thinking/ process
-Science process skills and nature of science/discovery
-Applied science (meeting real-world needs)
-Quantitative reasoning (using math to figure out everyday problems

Results
Results are preliminary and this work is ongoing. The theme areas were introduced to the VCE system through a session at the 2017 Winter Virtual Conference. Draft Extension publications were developed for each theme area and these are currently undergoing revisions. Ongoing efforts include: additional training for 4-H agents and volunteers, finalization of Extension publications, and development of evaluation tools that align with each theme area in order to support agent reporting efforts and system-wide data collection.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #5

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Community members are a vital part in helping to provide leadership and volunteerism in community. Chesapeake 4-H program has always been known for 4-H programs in livestock, horse and camping but there is such a larger need to expanding the 4-H program and what it offers. 4-H should have programs that include all program areas and offers to all those within the area.

What has been done

Throughout the year, parents and community members were asked to share their time on a short term basis or for a specific program. Volunteers completed the screening process and participated in volunteer training on positive youth development, 4-H and policies.

Results

As a result of recruiting the volunteers, the 4-H program was able to offer more programs to the youth within the community. The volunteers helped to reach 4926 youth in the City through 4-H programs. The Chesapeake 4-H Clubs had 490 youth enrolled in the various 4-H projects. The afterschool programs and short term programs had 108 youth participate in the programs. Our in school programs reached 4153 youth and our camping program reach 205 youth. There was an 23% increase in 4-H volunteers this past year. One hundred and thirty three 4-H volunteers volunteered 17450.00 hours throughout the 4-H year, with an estimated value of $288,294.50. There were 60 teen volunteers that volunteered 5,400.00 hours which is an estimated value of $72,792.00. The overall total of the amount of hours completed by Chesapeake 4-H volunteers was 22,540.00 hours which is an overall estimated value of $361,086.50.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #6

1. Outcome Measures

Number of limited resource youth trained in STEAM content related to environmental education and agriculture.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

he frequency and diversity of Virginia 4-H STEM programs has increased in recent years. Program descriptions and county-level reporting indicate that these programs are reaching a large number of youth. A total of 97,045 youth (48% of enrollment) completed at least one STEM project in 2014-2015. While some of these programs have been disseminated and supported at the state level (e.g. Maker), many have developed at the local level due to youth and volunteer interest. A comprehensive statewide survey of STEM programs has not been undertaken since the rapid expansion of 4-H STEM programming. A STEM program survey of 4-H agents and volunteers provides an updated snapshot of existing programs that could be replicated, identifies areas for STEM program growth, and guides STEM professional development planning.

What has been done

In 2016, the STEM subteam of the Positive Youth Development Program Team developed and administered a STEM program survey for 4-H agents, volunteer leaders, and other extension personnel involved in STEM-related youth programs. The results of this survey will allow the STEM subteam to share successes across the commonwealth, identify needs for STEM professional development, and identify resources needed for STEM programs. These findings will be used to focus plans for future professional development and STEM program support.

Results

27 existing STEM programs were reported on by a total of 18 VCE agents, specialists, and volunteers. Results indicate that Virginia has a wide variety of STEM offerings for youth spanning multiple delivery modes. Of the programs reported on, 42% are in-school enrichment programs, 22% are afterschool programs, 14% are programs held at camp, 11% are special interest clubs, and 11% are traditional 4-H clubs. STEM programs are in a diverse range of content areas, including: archery, animal science, electricity, robotics, rocketry, scientific investigations, and environmental/ water education.

The most frequently listed agent support needs were hands-on training, funding, curriculum materials and supplies, volunteers and volunteer support, and evaluation assistance. A wide range of specific curriculum needs were identified, many in content areas where other units are currently conducting STEM programming.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #7

1. Outcome Measures

Percentage of youth who make positive choices.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
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
irginia 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 #8

1. Outcome Measures

Percentage of youth who effectively communicate.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Experts such as parents, teachers, employers and others who work with young people know that communication skills are essential tools for success throughout life. The Virginia Department of Education (VDOE) has sighted oral communication skills as a Standard of Learning Objective for grades K-12. Subsequently proving that the ability to write and speak effectively are critically important and marketable life skills.

What has been done
4-H contributes to developing communication skills through 4-H Presentations. In 2017, Washington County 4-H members completed an oral presentation and increased knowledge in written and oral communication skills, research, and self-esteem. 801 youth completed this project by outlining, writing and delivering a speech using visual aids during their in-school, project, and community 4-H club meetings.

Results

program evaluation based on member, teacher, and administration comments, SOL testing scores, and member participation results proves the validity of 4-H presentations in developing strong communication skills.
-Washington County Public School 4th and 5th grade teachers require students to complete a 4-H presentation for project grade/credit because this project fulfills English Standards of Learning in both oral and written language.
-5th grade educators use the 4H oral presentation format/contest (introduction, body, conclusion) to teach students the 5-paragraph writing model.
-231 youth competed during the Washington County 4-H Presentation Contest. 104 of those youth advanced to the area and district contests with 77 members (73%) winning champion honors for their presentation. Further proving the power of the 4-H presentation format in teaching youth how to communicate.
-Dr. Janet Lester commented, ?When students speak before our Board of Education I can always spot a 4-H member because of the way they present themselves and speak.?
-During Virginia 4-H Congress, 6 senior 4-H members earned state champion honors through oral presentation contests.
-Washington County 4-H has the greatest number of middle and high school members continuing on with 4-H public speaking (at county, district and state levels) because of the confidence and knowledge they have gained through this program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #9

1. Outcome Measures

Youth Meat Quality Assurance Training Helps Build Better Youth and Develops Youth Agvocates

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
With the increasing numbers of mouths to feed, the responsibility of farmers and agriculturalists to meet that need becomes increasingly critical. Conversely, as the demand for high quality,

increased quantity of food grows, the knowledge of the average citizen regarding how their food is produced and what that entails wanes. 4-H and FFA youth enrolled in livestock projects are involved in the day-to-day care of food animals that will become part of the worldâ??s meat supply. It is crucial that youth receive proper training and education on the importance of quality care and husbandry techniques applied to these project animals. Food animal production and those involved on a daily basis continue to fall under increasing scrutiny concerning the care and well-being of these livestock. While this training at the fundamental level satisfies a requirement to exhibit these animals at the State Fair of VA, it more importantly provides youth with knowledge and information to be conscientious, successful producers and positive, valuable advocates for the meat animal industry.

What has been done

Youth Meat Quality Assurance Certified Adult Trainers provided hands-on, experiential learning opportunities for youth that involved in-depth information on the production of meat animal projects and the proper animal husbandry techniques required to produce healthy animals and quality meat products for the consumer. The full program involves educating youth in 10 areas or Good Production Practices that cover topics from client/veterinarian relationships, responsible use of antibiotics, implementing herd health management plants, and training interim care providers. Youth receive a brief overview of each of the 10 GPP with a more detailed study of three units that rotate annually. General animal care and well-being is reviewed each year. GPP specific activities allow youth to practice what they've heard and provide an opportunity to learn by doing in individual and group settings.

Results

A total of 894 youth were certified by 26 trainers during 2017. Of these, 305 youth were required to complete the training in order to exhibit livestock at the 2017 State Fair of Virginia Youth Livestock Shows. Participating youth confirm a better understanding of the importance of proper animal management techniques and an increased ability to explain to consumers and the public why we care for and manage our animals the way we do.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #10

1. Outcome Measures

Using Bugs to Interest Kids in STEM Fields

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Youth, teachers, and parents seek opportunities to fulfill family learning experiences, SOL requirements, and enrichment. Science education is an important part of these learning priorities. It is lacking in many areas and is an integral part of STEM learning. Virginia Tech is in need of recruiting future students in the sciences. There is a desire by special needs adults and children to seek opportunities to enrich their lives in science and tactile learning. A large annual science literacy event, two entomology camps, and collaboration with museums, schools, localities, and groups to promote entomology and science fulfills these needs.

What has been done
STEM is an interdisciplinary and applied approach that is coupled with hands-on, problem-based learning. The Virginia Tech Department of Entomology, its alumni, friends, and donors have collaborated to organize, promote, and host the annual Hokie BugFest for the past seven years. They also host two Hokie BugCamps for youth ages 5 to 13. Faculty, staff, students, alumni, and friends collaborate to serve localities, institutions, and associations needs and activities to serve the public. The collaboration involves a year of planning and effort. These programs are supported by institutional funds and donors in the pest control, hotel, and pest management industry.

Results
Attendance at Hokie BugFest was 8,400 this year - steady growth over the past seven years from around 2,000 in the first year. We had 27 sponsors in 2017. This included the pest management and crop protection industry and a number of university collaborators. The Alwood Entomological Society was the largest contributor of volunteers again this year. The event allowed the group to raise funds for their public service activities. Total volunteers exceeded 250. A survey of adults (age 18-71) indicated 77% of respondents were female. 54% indicated this was their first time attending the event. 29% reported a fear of arthropods. 94% reported learning about arthropods made them feel more comfortable around them. 98% reported exhibits impacted their attitude towards these creatures in a positive way. 61% expressed a fear of pesticides and 83% felt pesticides were harmful to their health. Yet, 79% felt the exhibits positively impacted their attitudes towards pesticides regardless of how they felt initially. Kids (age 4-15) participated in the Junior Entomologist Certificates this year. Obviously the younger ones had assistance. So we also had grandparents, parents, and siblings involved. Kids took 622 forms and returned 515 to earn certificates. Only 42% reported this was their first visit to the event; 51% were male. Of the 30% who reported a fear of arthropods; 58% said attending the event reduced that fear. A majority 86% reported learning about arthropods made youth more comfortable to be around them and 86% indicated they plan to continue learning about arthropods in the future. HBF 4-H insect collection competition had 12 entries from Carroll, Halifax, King George, Montgomery, Spotsylvania and Wise Counties. A budding young entomologist took the top prize; an alumni of the contest who entered for the fourth time last year. He entered as the "bug-buster" and sported a hat with the logo. Facebook users exceeded 100,000 again in 2017. The site had 1,070 likes.
Other Activities Included:
Bugged Out! 4-H Camp at the W.E. Skelton 4-H Educational Conference Center (25 Youth) -

Represented Virginia Tech's department of entomology to educate youth on major insect orders and characteristics, collecting insects, and pinning insect specimens; youth created insect collections to be entered for competition at Hokie BugFest.
Mini Hokie BugCamp (19 Youth) - This one day camp was held for children ages 6-8 years old. The goal was to inspire them to become interested in science through insects.
Hokie BugCamp (21 Youth) - This one day camp was held for children ages 9-13. Youth participated in several entomology activities, one of which was building their own insect collection for the 4-H Insect Collection Contest at Hokie BugFest.
Science Night at Prices Fork Elementary School, Blacksburg, VA (70 Youth, 40 Adults) - Represented Virginia Tech's department of entomology; answered children's questions relevant to insects and arthropods; showcased live and preserved specimens.
Pulaski County 4-H Entomology Tour at Virginia Tech (70 Youth, 12 Adults) - Represented Virginia Tech's department of entomology; showcased insects and arthropods from the bug zoo to a local 4-H group.
Kids Tech University at Virginia Tech (400 Youth, 200 Adults) - Represented Virginia Tech's department of entomology; showcased insects and arthropods from the bug zoo, as well as preserved collections to Kid's Tech participants.

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Nothing to report.

Key Items of Evaluation

Nothing to report.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

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