2018 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 educational 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 under-represented 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 11 Agricultural Research and Extension Centers (ARECs) 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 every Unit office completed a local situation analysis. Unit profiles were created based on data gathered from a variety of sources such as US and Agriculture census data. This data was supplemented with community input collected via 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 fourth 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 Virginia Tech 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 associate director before being submitted to REEport.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	360.6	30.0	339.0	18.5
Actual	378.0	31.0	307.0	0.0

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

Merit Review of Research Conducted by the 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 Statistical Applications and Innovations Group 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.

Merit 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 non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey specifically with non-traditional groups
- Survey of selected individuals from the general public
- 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 of situation analysis in every VCE Unit was conducted in 2018 and 2019. Expected completion is Spring 2019
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. In 2018, VAES and VCE held an Agriculture and Natural Resources (ANR) Summit to bring together stakeholders from across Virginia to discuss priorities and initiatives of importance.

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 11 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. Invitations to the ANR Summit were identified by asking for all AREC and academic departments, commodity groups, Farm Bureau, agribusiness groups, and other ANR constituencies to provide names and contacts of possible stakeholders.
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 108 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
- Survey specifically with non-traditional groups
- 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.
During the ANR Summit, participants (n=110) were invited to participate in round table discussions to identify critical topics for Virginia ANR and then discussion groups formed around selected critical topics. Each topic discussion was managed by a facilitator and recorder, who then provided a report of the inputs for each discussion. A summary and detailed report was generated from these discussions to provide guidance for VAES and VCE on topics of concern and priority to ANR stakeholders.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- In the Staff Hiring Process
- 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 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. The report was provided to all participants at the ANR Summit.
The ANR Summit input was summarized into a one-page informational flyer and posted to the VT College of Agriculture and Life Sciences website, distributed to the ANR advisory council and to the participants at the ANR Summit.

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.

Numerous recommendations were identified through the ANR Summit. Among these were:

- Enhance communications with stakeholders, including holding periodic mini-summits to address emerging challenges
- Design and deliver continuing educational programs that create a technologically advanced workforce
- Showcase and develop ANR innovations and technologies
- Improve ANR policies and regulations
- Enhance research programs on urban agriculture
- Increase visibility and demonstrate value of VCE and VAES
- Grow public-private research and innovation partnerships
- Create a university-industry consortium that spans ANR industries and disciplines
- Increase investment in ANR
- Address challenges arising from the loss of agricultural land

VAES identified an initial priority research and Extension initiative described as the SmartFarm Innovation Network. A flier was developed to explain this initiative and shared with stakeholders electronically, through the VT CALS and VAES websites, and in physical form. Efforts to advance this initiative included developing a seed grant program, discussing with the AREC and academic departments to target faculty research and Extension efforts and new faculty hires (selected) toward the SFI Network Initiative, and through a 4-day statewide tour that included 30 university and college administrators visiting 10 of the 11 ARECs and interacting with stakeholders and AREC faculty. VAES and VCE can address many of the recommendations in this initiative. Additional initiatives will be advanced as we address pursue this effort.

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	7292809	2318549	3957180	2683509
Actual Matching	12420273	2318426	9482653	2792707
Actual All Other	29195872	978839	51773070	982283
Total Actual Expended	48908954	5615814	65212903	6458499

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

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Agriculture Profitability and Sustainability

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	10%	0%	10%	10%
111	Conservation and Efficient Use of Water	8%	0%	0%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	1%	0%	10%	10%
202	Plant Genetic Resources	3%	0%	10%	15%
204	Plant Product Quality and Utility (Preharvest)	10%	0%	0%	0%
205	Plant Management Systems	16%	20%	10%	15%
206	Basic Plant Biology	0%	0%	5%	0%
211	Insects, Mites, and Other Arthropods Affecting Plants	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: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	122.5	16.0	226.3	13.5
Actual Paid	134.8	19.0	164.9	8.0
Actual Volunteer	4422.0	72.0	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**
2441361	1811946	2124900	1391755
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
4695194	1922077	5091932	803971
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
9773692	934113	27800759	525687

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

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4143320	2436311	1528970	100920

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

Patent Applications Submitted

Year:	2018
Actual:	3

Patents listed

Artificial oocyte activation, Methods for Improving Agrobacterium-mediated transformation of plants, Plant-Mediated Silencing of a Fatty Acid and Retinoid Binding Protein in Pratylenchus penetrans.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	177	29	206

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of publications created.

Year	Actual
2018	2719

Output #2

Output Measure

- Number of Extension presentations delivered.

Year	Actual
2018	2067

Output #3

Output Measure

- Number of peer-reviewed journal articles published.

Year	Actual
2018	206

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	Dairy cow maternal influence on fertility and calf performance
21	Elucidating environmental influences of bovine dam on calf performance and rumen microbial profiles
22	Growing and Selling VSU Introduced Niche Crops Earned $70,000 for Virginia Limited Resource Small Market Farmers
23	Perfectly portioned, sweet tasting Bluegills (Lepomis macrochirus) may ?Net? Virginia Limited Resource, Small Farmers More Cash
24	Applying simple artificial insemination in sheep on small farms

Outcome #1

1. Outcome Measures

Increase in the adoption of IPM practices

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sweet corn is an important vegetable crop with over 3000 acres grown in Virginia with a market value exceeding: $7 million. Sweet corn is also a common small-farm summer produce crop for roadside and farmerâ??s markets in numerous towns and cities throughout Virginia. Effective control of insect pests such as corn earworm and fall armyworm is essential for commercial sweet corn production.

Most conventional growers spray insecticides multiple times from tassel to harvest and plant Bt

transgenic sweet corn varieties. In order to help guide (and perhaps reduce) the number of insecticide applications made on this crop, we established a scouting program based on pheromone trap catch of moths. For instance, a catch of 5 or fewer moths per night is relatively low, and a spray interval of 4-5 days between sprays may be adequate; however, a trap catch of 10 or more moths in a night is high suggesting a need to increase the spray interval to perhaps every 2-3 days.

What has been done
Twelve Virginia Cooperative Extension Agents were instructed on how to scout for key insect pests of sweet corn including using Heliothis traps to monitor for corn earworm and bucket traps to monitor for fall armyworm. Agents were supplied with travel money, traps and lures to scout commercial sweet corn farms in VA and educate and interact with growers to help promote the program.

In 2017, 29 sweet corn fields from 12 counties were monitored for insect pests, and in 2018, 30 sweet corn fields from 18 counties were scouted. Moth trap data served as a pest management decision-making tool for the growers. In addition, trap catch data were posted weekly on the VA Ag Pest Advisory, which was disseminated to hundreds of people across the state and surrounding states throughout the summers of 2017 and 2018.

Virginia Counties where scouting was implemented on at least one farm: Accomack, Virginia Beach, Northampton, Westmoreland, Amelia, Hanover, Halifax, Campbell, Charlotte, Loudoun, Rappahannock, Page, Frederick, Rockingham, Montgomery, Franklin, Carroll, Washington

Results
Information was disseminated to growers via: 1) direct face-to-face discussion with Extension agents or T. Kuhar at the field or meetings; 2) by posting results of the trap catch monitoring on the Virginia Ag Pest and Crop Advisory weekly in 2017 and 2018; 3) by production of two VCE numbered factsheets (listed below); 4) by presentations at five grower meetings or field days. We estimate that over 100 vegetable growers in Virginia are now more knowledgeable regarding insect pest management in sweet corn.

4. Associated Knowledge Areas

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

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
2018	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 7068 which makes Virginia one of the national leaders in BQA activities. During 2018 there were 639 producers either certified or re-certified. These producers reside in nearly every county of the Commonwealth, and several surrounding states. We estimate that the certified producers represent over half of the cattle produced in Virginia. Added value of cattle produced on BQA certified farms is estimated to be $1.5-2.0 million annually.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
307	Animal Management Systems
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

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia farmers earned over $217M from direct sale of agricultural products through farmers? markets, CSA, internet sales, roadside stands, and pick your own operations (USDA NASS, 2015). Of these 6,418 farm operations, 545 were in business less than five years, and 821; six to ten years (USDA NASS, 2015). A beginning farmer is defined as an individual who has been operating a farm for less than ten years. Direct sale marketing appears to be a profitable entry point for beginning farmers to attempt, yet existing data demonstrates that few beginning farmers are actually entering into direct sale markets or have reported earnings related to direct sale outlets. Additional educational outreach to improve beginning farmer awareness of the techniques and practice of different types of direct marketing may boost beginning farmer confidence and future sales in the competitive farm marketplace.

What has been done
In order to address the identified need for additional educational outreach to improve beginning farmer awareness of the techniques and practice of different types of direct marketing, the VSU Marketing and Agribusiness extension program developed a series of hands-on experiential marketing tours tailored to meet the marketing needs of beginning farmers working directly with the VSU Small Farm Outreach program agents to start a profitable small farm enterprise in Virginia. Tour sites range from a winery to a lavender farm and retail store. At these farm tours, beginning farmers learn directly from successful farm operations how to market their farm products successfully.

Results
In 2018, as a result of the conduct of experiential farm tours, 107 beginning farmers learned about different ways to sell and package their products successfully. Nearly 90% of participants stated that the tours helped them have a better idea of what may work for them after seeing the different operations and products first hand. Over 75% of participants believed that participating in the

tours increased their chances to be successful in starting their farm business. Over 90% of participants became aware of at least one new market outlet type that they did not know previously. 100% of participants stated that they preferred experiential learning over lecture presentations for increasing marketing knowledge and skills.

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

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Nearly 18% of Virginia residents live in a food desert where access to healthy fresh food is limited due lack of proximity to a nearby grocery store, farm market, or other fresh food retailers. A typical healthy and balanced diet includes a minimum of two (4.9) ounce portions of fish a week. Residents of Virginia food deserts are challenged to find affordable fresh fish options. The potential to raise and sell fresh tilapia appears to be a promising enterprise for interested food desert communities in Virginia.

What has been done
In 2018, the VSU Aquaculture program provided training and on-going technical assistance to establish eight (8) non-traditional Tilapia raising operations within, or in close proximity with the ability to distribute conveniently to Virginia food desert communities. Preliminary market feasibility studies were conducted to determine consumer willingness to pay, potential market outlets, and barriers to food desert consumer acceptance. Tilapia tasting events took place to introduce preparation and cooking methods to potential customers.

Results

As a result of establishing eight (8) non-traditional tilapia aquaculture systems within, or in close proximity with the ability to distribute conveniently to food desert communities, conducting preliminary market feasibility studies and tasting events, food desert residents will have access to fresh fish. Harvestable yield per system was determined to be 10 to 20 pounds of fresh fish per month. Each system can produce up to 120 to 240 pounds per year, with one fish typically weighing 8 ounces with an affordably priced market value of $3.00 per fish. With a typical yield of 20 to 40 fish per month or 240 to 480 fishes per year, a food desert operation may potentially earn a gross income of $720 to $1,440 annually, with an estimated economic multiplier effect of 1.66 (initial $1 expenditure with added 66 cents), therefore infusing the local economy in the range of $1,195 to $2,390 per operation. Total operational potential local economic benefit range is $9,560 to $19,123 (eight operations). Additionally, a total of 1,920 to 3,840 fresh fishes are made available for purchase by food desert residents in Virginia to increase their consumption of fresh fish in a healthy, balanced diet.

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

What has been done

The following actions were taken in 2018: Recruited and set up quarterly meetings with ?Dream Team? with four VCE specialists providing feedback and guidance on related educational content and promotional materials, as well as promoting the kiosk at local Extension events. owners and managers; Launched Virginia MarketMaker portal in June 2015; Designed content for VCE VA MarketMaker portal, includes FAQs, blog posts, resources, and testimonials; Purchased mobile Virginia MarketMaker kiosk that is available upon request statewide; Published student-led non-peer reviewed Virginia Cooperative Extension fact sheet and YouTube video on how-to sign up an agribusiness on the MarketMaker portal; Published six blog posts designed to demonstrate use and value of portal to VA agribusiness; Designed and distributed 400+ copies of the VA MarketMaker rack card; Hired and provided travel funds to two VT-AAEC students presented the VA MarketMaker kiosk at 20+ meetings across Virginia; Virginia Cooperative Extension (VCE) Agriculture and Enterprise Management and Marketing team leads the Virginia MarketMaker Action Team.

Results

The following results were realized in 2018: 200+ farms and agribusinesses completed unique registrations within first six months; Selected winner of the 2015 Innovation Award at the 2015 National Value-added Agricultural Association annual conference for student-led project titled ?Strategic Management of Applied Economic Problems Through Experiential Learning: Launching Virginia MarketMaker? and Secured $2,500 cash award from Farm Credit; Featured in the National MarketMaker 2015 Year in Review; Submitted 2017 Southern Region Risk Management and Education Center grant = $50,000 to include financial support for promotion of the VA MarketMaker portal; Secured initial funding (2015) to support launch of the Virginia Market Maker portal from Farm Credit of the Virginias and the VA Department of Agriculture; Secured additional annual funding commitment from VDACS (2016); Invited by Stephanie Agee, VDACS Marketing Director, to present ?Diversifying Markets to Mitigate Risk Using Technology to Engage & Connect with Suppliers and Customers? to 30+ VDACS marketing specialists in June 2016; Kim Morgan elected to serve as Southern Region Representative (2016-2019) on the Market Maker Policy Advisory Council

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Farm family generational transitions always offer unique circumstances and demand sensitivity to the personalities and relationships involved. This is also an opportunity for VCE to play a one-of-a-kind role with its local presence, its capacity to meet people face-to-face, and VCE?s place in communities as a true ?third party? with no direct interest in finance or marketing of products. Over 70% of Virginia?s farmland is projected to change hands between 2010 and 2030.

What has been done
In 2018, the ANR Extension Agent for Farm Business Management serving Planning District Six had in-depth multi-session meetings with 7 families that were wrestling with one stage of generational transition or another. These farms ranged in size from 70 to 500 acres and represented over $4 million in real estate value and over $1.5 million in annual economic activity.

Results
In two cases the Extension Agent for Farm Business Management explained conservation easements in Virginia and provided the landowners potential ?pros? and ?cons? of such a decision and both families moved forward with this process. In two other cases the Extension Agent for Farm Business Management worked with farm families that were contemplating a significant expansion, providing enterprise budget projections, and pro forma financial statements to estimate outcomes. In both cases, the families ultimately decided the risk was too great at this time and are still exploring possible options. Three other farm families were wrestling with issues that involved farmland rental and lease arrangements at the same time at least one family member was facing age and health circumstances that no longer allowed them to farm. Providing advice regarding land rental rates and arrangements can be very thorny since they impact the farmer tenant and can have ripple effects in a community. All three families arrived at new rental agreements with their tenants but the decisions resulted in changes on the family farm and were correspondingly difficult.

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Virginia Beginning Farmer and Rancher Coalition Program aims to improve opportunities for beginning farmers and ranchers to establish and sustain viable agricultural operations thorough whole farm planning programs and online learning opportunities. We offer several, place-based whole farm planning training opportunities across Virginia. These trainings provide farmers with a range of classroom-based workshops, farm tours, field instruction, and networking opportunities using our Whole Farm Planning curriculum. Our online learning opportunities allow farmers to access the whole farm planning and other farming information without attending a place-based training.

What has been done
Using the Virginia Beginning Farmer & Rancher Coalition Whole Farm Planning Curriculum, five programs offer whole farm planning workshops across the state. These programs include the Certified Farm Seekers program, which offers its programming through an online system to participants statewide; the Northern Piedmont Beginning Farmer Program, offering programs in Fauquier County, VA; the Virginia State University Small Farm Outreach Program whole farm planning workshops, based in Petersburg, VA but offered across the state, as well; and Appalachian Sustainable Development?s whole farm planning workshops, offered in southwest Virginia; and the Growers Academy, offered by the Catawba Sustainability Center in the New River Valley region.
In addition to in-person efforts, the Virginia Beginning Farmer & Rancher Coalition offers several opportunities for online learning. Online opportunities for beginning farmers in Virginia include webinars, videos, and social networking through Facebook, Twitter, and Instagram.

Results

In 2018, the Certified Farm Seekers program continued to use an online format to work with participants across the state. This program is self-paced, allowing farmers to work through the whole farm planning curriculum from their homes.
The Virginia State University Small Farm Outreach Program had 33 workshops that were evaluated in 2018, which included those associated directly with Virginia State University, as well as the Fauquier Education Farm and Northern Piedmont Beginning Farmer program. These programs were held across the state. There were 428 evaluations received from all 33 workshops. A majority of attendees (73%, n=204) identified with being prospective or explorer farmers or as startup farmers, meaning that most participants are not currently farming or are in the very early stages of their farm. Nearly every participant (99%, n=417) indicated that they learned from the workshop they attended, and a majority of topics covered (91%, n=1148) are ones that participants already use or intend to use on their own farms.
Appalachian Sustainable Development continued to offer topical workshops and farm tours for participants in southwest Virginia in 2018.
The Growers Academy was not offered in 2018.
In 2018, three Beginning Farmer webinars were offered. The first webinar, The State of the Craft: Virginia Hops Enterprise Budget and Market Analysis, was offered in July 2018 and had 3 attendees fill out evaluations. Virginia Community Garden Network was offered in October 2018 and had 3 attendees fill out evaluations. Understanding Fresh Produce Purchasing Considerations to Increase Access by Local Producers to Virginia?s Market Sectors was offered in October 2018 and had no attendees fill out evaluations.
Webinar data shows overall positive learning outcomes, which were unique to each webinar. Across all webinars offered by VBFRC, 100% of evaluation participants agree or strongly agree that they ?intend to apply the information from this webinar to my work.?
The Virginia Beginning Farmer & Rancher Coalition also uses social media and online communications to keep farmers and ranchers across Virginia updated about the happenings within and outside of the Coalition. These communications include two listservs and accounts on Facebook, Twitter, Instagram, and YouTube. The two listservs include one for service providers and Coalition members, with 207 members on the list, and one for farmers and interested parties across the state, with 683 members on the list. VBFRC?s Facebook page has 1,887 followers and 1,886 page likes. VBFRC?s Twitter account has 152 followers. VBFRC?s YouTube channel has 41 videos, 348 subscribers, and 46,597 views. VBFRC?s Instagram was has 154 followers. The listserv, Facebook, Twitter, YouTube, and Instagram accounts were all started prior to 2018.
Stories:
?This was a great help to the current marketing class I am in because I am doing a marketing project on hops which is something I want to pursue within the next five years if feasible.

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia farms face a constant struggle to increase revenue; and in most all cases, that revenue is tied directly to what the land can produce and the farm?s ability to generate sales. One resource that local farms are finding to be highly successful in generating supplemental revenue is the development of agricultural programs, events, and attractions that invite local residents and tourists onto their land to experience the peaceful but energized farm environment. In Virginia, agritourism represents a $2.2 billion economic impact. The top motivations for Virginia?s farm businesses to operate in the agritourism sector are to: generate additional income, market farm products, and share a lifestyle or way of living with others.

In April 2018, the Virginia House and Senate General Laws Committees requested a review of agritourism facilities and building code application ?in order to better understand the issue and its potential negative impact on rural economic development?.

What has been done
Virginia Cooperative Extension actively engages its partners to coordinate and host the state agritourism conference and regional workshops and expand local agritourism efforts including a branding campaign for local products and on-farm events. Extension responded to the 2018 General Assembly?s request and conducted a review of Virginia agritourism public safety and welfare concerns and the impact of building codes applied to agritourism facilities.

Communication with over 900 agritourism stakeholders is maintained by Extension through its statewide listserv with these entrepreneurs provided access to resources and support for building their businesses. In addition, an array of publications focusing on agritourism liability and resources are available on the Extension website.

Results
Agritourism operations are expanding 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.

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 is recognized throughout the state as an economic development driver.

The 2018 report on agritourism and building codes delivered a stronger partnership between legislative lobbyist, agritourism entrepreneurs, and local officials. Ultimately, the conversations created a foundation for continuing the dialogue and increased the desire to collaborate in assisting farms to ensure safe environments for agritourism guests.

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
2018	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. Virginia Tech researcher and Extension Specialist, Dr. Bob Lane, at the Virginia Seafood Agricultural Research and Extension Center, with colleagues from other universities wanted to know how well these temperatures were controlled within the food cold chain and the effect of interactions among the identified participants.

What has been done

Quantitative measurements of oyster internal and storage environment temperatures were collected, qualitative interviews of supply chain members were conducted, and predictive food safety modeling of based upon the temperatures were generated. 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. 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 as 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 targeted oyster market value. Warmer weather data found challenges maintaining oyster environment storage temperatures below 45 °F. Five (5) of twenty-five (25) shipments during the summer months resulted in internal oyster temperatures higher than the threshold of fifty (50) °F and up 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. 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.

4. Associated Knowledge Areas

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

Outcome #10

1. Outcome Measures

Controlling invasive pests through biological controls and management strategies

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The brown marmorated stink bug (BMSB), Halyomorpha halys (Stal), is an important invasive pest in North America and Europe. The insect has established as one of the most conspicuous and damaging insect pests in Virginia as well as other Mid-Atlantic states. In addition to being a nuisance in human dwellings, this Asian stink bug damages a wide range of crops including tree fruit, vegetables, small fruit, soybeans, corn, cotton, and sorghum.

What has been done
With funding from a variety of sources including USDA-NIFA Specialty Crops Research Initiative, Special Cooperative agreements with the USDA-ARS, and various in-state agencies since 2012, entomology professors T. P. Kuhar and J. C. Bergh have been researching various aspects of the biology and ecology of this invasive stink bug in order to develop integrated pest management solutions for growers.

Results
A plethora of research studies have been conducted and thus far, we have been able to: 1) document the injury caused by the feeding of BMSB nymphs and adults on tree fruit, vegetables, soybeans, and cotton; 2) determine the importance of bordering habitats adjacent to orchards and soybean fields on subsequent BMSB infestations; 3) evaluate the overwintering ecology and emergence patterns of BMSB adults from shelters; 4) determine the effectiveness of various pheromone lures and trap types for catching BMSB in traps and what trap catch means for pest management decision-making in apples and vegetable crops; 5) evaluate the usefulness of trunk traps to monitor seasonal movement on trees; 6) determine nymphal host-choice preference; 7) determine the cold-tolerance of BMSB and predict the impact of severe cold spells on populations; 8) determine the lethal high temperature of BMSB and the efficacy of heat treatments to kill bugs in export cargo; 9) determine the effectiveness of kaolin and essential oil repellents for protecting vegetables from BMSB; 10) determine the effectiveness of various conventional, organic, and experimental insecticides and spray programs for control of BMSB in orchards and various vegetable crops; and 11) identified physical and biological factors influencing overwintering site selection by BMSB. Along the way, we have produced over 30 publications, produced several videos and extension documents, and have educated thousands of people on the biology and management of this invasive insect in Virginia through numerous invited talks and media interviews. Evidences: http://www.stopbmsb.org/index.cfm

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
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In past years cattle and other livestock producers struggle to keep up with the nutrient requirements of their livestock and mitigate the mud during the winter months. Many producers are unaware of the nutrient requirements of their livestock. Producers in the area also harvest their own forages to feed their livestock. There are a lot of great pastures of and hay fields. There are also a lot of mediocre hayfields and pastures. These pastures can be renovated to remove unwanted plants, weeds, and forages. Weeds have the potential to choke out essential forages (grasses) and leave unwanted forages with little to no nutritive values. When producers are unaware of these problems they could make hay that has low nutritive values and feeding it to their livestock. This is the potential to cause damage to breeding seasons, pregnancy rates, and other aspects of reproduction. Poor nutrition can also result in death of livestock.

What has been done
In 2018, two workshops were held to address these issues. In March, a Winter Feeding Workshop was held in Cumberland to address nutritional problems with local herds. As a part of the workshop, Kent Nutrition Group sponsored hay analysis at Cumberland Valley Analytical Lab. Agrarian Veterinary Services also partnered with VCE for this meeting. Dr. Lincoln with AVS spoke about body condition scoring of beef cattle and how to maintain a certain score throughout winter feeding. Amy Thomas from Kent Nutrition Group spoke on the nutritional requirements of beef cattle and where producers can get their nutrients for their herd (i.e. hay, feeds, feed additives, and supplements). Even though this program focused mainly on beef, questions, comments, and concerns were shared about small ruminant animals and equines. In June, a hay production workshop was held at Prince Edward Extension office. Topics such as harvesting, troubleshooting, fescue toxicity, hay sampling, hay nutrient analysis, and weed identification.

Results

Participants from the Hay Production workshop learned what quality hay looked like. They learned about proper storage techniques for hay. Dr. Pent and Amber Anderson published an article in the Virginia Cattlemen?s Magazine on The Costs of Weathered Hay using the demonstration from the workshop. From the Winter feeding workshop, 62% participants said that they felt like they were more informed about the nutrient needs of their livestock. Most of the producers attending the meeting were fall calvers (target audience) that began to feed between December and March. 62% participants agreed that they planned to test their hay more often, watch the BCS of their animals, feed supplements, improve grazing management, using optimal time to make the best hay possible. From the Hay production workshop participants indicated a clearer understanding of how to assess their hay fields, harvesting forages, hay nutrients, weed identification, hay storage, and hay sampling. Participants asked if we would hold programs in the future to help refresh this knowledge and update with new information. Many producers were fond of the weed control portion of the program.

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
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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Diseases of wheat and barley frequently result in yield losses from 10 to 20 percent in susceptible varieties, requiring one or more fungicide applications at a price of 29.6 dollars per ha, which would cost producers in Virginia alone 2.4 million dollars per year. Graduate students and post-graduates working in my program conducted research focused on the identification, genetic characterization, mapping of chromosome location, and development of DNA markers for genes governing resistance to diseases including fusarium head blight in barley, and leaf and stripe rusts, and fusarium head blight in wheat. Results from these studies provide researchers worldwide with the knowledge and tools to accelerate development of barley and wheat varieties having more effective and durable disease resistance. Development of varieties having durable resistance to prevalent and newly emerging diseases and/or new races such as fusarium head blight, stripe rust and stem rust provide growers, end users and consumers with a sustainable, economical and safe food supply.

What has been done

Wheat cultivar Hilliard, released in 2015, and Dyna-Gro 9811, released in 2017, are broadly adapted and expresses moderate to high levels of resistance to powdery mildew, leaf and stripe rusts, Fusarium head blight, leaf and glume blotch, Barley Yellow Dwarf Virus, Wheat Soil Borne Mosaic Virus, and Hessian fly. Wheat varieties USG 3118 and #Berkeley, released in 2017, and SR8483, released in 2018, also provide producers with varieties having resistance to the prevalent strains of stripe, leaf and stem rusts and Hessian fly.

Results

Wheat varieties released by Virginia Tech have been grown in more than 12 states in the eastern U.S., and on the basis of seed sales, more than 1.78 million units of certified seed of these varieties have been sown on over 890,000 acres (360,178 ha).

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 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Plant parasitic nematodes are a major constraint to agronomic crop production throughout the southeastern United States. However, nematode impacts on crop production are often overlooked and the efficacy of nematode management strategies including host resistance, crop rotation, and chemical or biological control depends on the specific nematode species present and their distributions within fields. Nematode diagnostic services are available at the Virginia Tech campus in Blacksburg, but many growers in the coastal plain region, where a majority of agronomic crops are grown and where sandy soils increase the risk of nematode problems, do not utilize this service due to a lack of awareness, inconvenience, and cost.

What has been done

Funding was requested from state commodity boards to help support the establishment of a crop nematode diagnostic lab at the Virginia Tech Tidewater Agricultural Research and Extension Center (AREC). A nematology research associate was hired and the plant pathology program at the Tidewater AREC started processing nematode soil samples in summer 2016. In addition, a survey of parasitic nematodes associated with cotton and soybean cropping systems is being conducted so that the distributions of economically important nematodes can be determined and this information can be disseminated to growers along with recommendations for IPM approaches for nematode control in the region.

Results

In 2016, nearly 2,000 nematode soil samples were collected and processed at the Tidewater AREC. These included research, survey, and diagnostic samples. Growers were provided with nematode assay results and management recommendations. The most important nematodes in cotton cropping systems were identified and on-farm trials are planned for 2017 in cooperation with growers. Grower awareness of nematode problems (where they are occurring and where they are not) has increased as has grower interest in testing fields prior to applying nematicides.

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
216	Integrated Pest Management Systems

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
2018	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 is 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 time frame. 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

Nine Extension Agents and a Specialist developed eight educational videos of specific grazing management evidence using professional videographers to capture images and commentary by agents and farmers. These videos explain and demonstrate natural world evidence, needed tools, and livestock/forage interactive management in short, specifically useful segments intended to keep the viewers attention. Additionally, a three-part video series focusing on Summer Stockpiling

added to the Graze 300 VA web site. Extension agents and Specialists have delivered a myriad of other educational meetings, field days, and farm visits focused on providing farmers with the latest technology in grazing management. Net returns found in case studies point towards $200 net per cow from 300 days grazing mgt. In one farm example, the maximum revenue came from the biggest herd of beef cows the land could support, but with no net income. Hay was fed 150 days per year and explains where the money went and why so many cows could be stocked on a given area of land. Over the data collection period, 100 fewer cows were stocked on the same land, these cows ate hay for only 60 days due to installing Graze 300 practices and the farm realized 5 times more profit from the same land.

Results

To date, there have been 1203 online views of these videos. The three-part Summer Stockpile video series is the most popular at 342 views. Earlier the Falling Plate Meter video was number one as viewers found its demonstration of a measuring tool most interesting. Funding ($8,000) for this initiative was provided by the Agua Fund in an effort to encourage environmental stewardship and the protection of local waterways that can be impacted by overgrazing and poorly managed pastures.

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
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	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 as a means of reaching most commercial tree fruit growers.

What has been done

Virginia Tech faculty involved in tree fruit industries in Blacksburg and the Virginia Agricultural Research and Extension Centers (Entomology, Plant Pathology and Horticulture) participate in a week-long series of full day fruit schools in February. Technical issues are presented in a venue that encourages participation from fruit producers, both in the form of questions as well as contribution of ideas. VCE agents are central to the planning of these fruit schools, both in terms of logistics and organizing stakeholder input in program development.

Results

Growers that account for most of the tree fruit production acreage take part in these fruit schools. This venue is used to provide pesticide applicator recertification credits. With two-way information exchange, 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
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest 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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The economic and physical health of the sheep and goat industry in Virginia is looking up, with a 5% increase in sheep and 1% increase in goat inventory. Coupled with sheep and goat population increases are on-going producer challenges to maintain healthy sheep or goat herds. Internal parasite infections are the number one health issue impacting sheep and goat health from birth to harvest. Parasitic infection negatively impacts producer profitability due to the expense of treating herd illnesses which may result in deaths and low carcass weights for market sale. Traditionally, producers rely on costly deworming chemicals to control infections resulting in costly misuse and over-use. As a result, internal parasites such as Barber Pole Worm have become resistant to available dewormers, leaving limited resource producers in need of educational deworming trainings.

What has been done
In response producer need for deworming educational trainings, the VSU Small Ruminants program conducted three (3) regional trainings, one (1) national conference training, and one (1) YouTube video entitled ?Everything You Need to Know About Worms in 25 Minutes.? Accessible at: https://www.youtube.com/watch?v=xzNnfPYGhUU. Two Cooperative Extension bulletins were published on deworming and were distributed at trainings or made available online to a minimum of 395 individuals.

Results
As a result of conducting five (5) regional, national and online deworming educational trainings and writing/distributing two (2) extension bulletins, 395 small ruminant producers, youth, and ANR agents were trained in the cost-effective deworming techniques with a focus on FAMACHA® methods, with 50 small ruminant producers receiving certification in FAMACHA® methods for selective deworming in their herds and flocks. Program evaluations (300 collected) indicated that

71% (213) of participants gained knowledge pertaining to pasture management for parasite control; 95% (285) of participants gained knowledge pertaining to coccidian control; 94% (282) of participants gained knowledge pertaining to the proper use of dewormers; 95% (285) of participants gained knowledge pertaining to alternative methods of parasite control and 92% (276) of participants gained knowledge on when to deworm or not. Most importantly, 97% (291) of participants indicated that they would only deworm animals that were clinically parasitized based on FAMACHA© scores, Five Point Check© and performance indicators (weight gain, frame appearance, etc.) and then if needed, would administer deworming treatments. There is a potential economic benefit to limited resource, small sheep and goat producers who attend these deworming trainings. The estimated economic savings that may be realized by participating sheep and goat farmers is as follows: Of the participating 180 sheep producers (averaging 15 adult animals and 25 lambs per farm) prior to training, it is conservatively estimated they would have spent $$84.50 per year ($0.80 per adult x 15 x 2 times per year + $1.21 per lamb x 25 x 2 times per year) on deworming their entire flock at least two times. Now after training, it is estimated that participating sheep farmers? total annual deworming costs may have been reduced to only $27.40 (30% x 15 adults = 5 sick adults x $0.80 per deworming = $8 x 2 times per year+ 30% x 25 lambs = 8 sick lambs x $1.21 per deworming = $9.70 x 2 times per year) on deworming only as needed based on tools such as FAMACHA©, Five Point Check© and other methods of sustainable integrated parasite control. Therefore, deworming trainings potentially saved participating sheep farmers $57.10 per farm ($84.50 prior cost - $27.40 actual cost). The combined 180 participant sheep farms? savings totals $10,278 per year (180 sheep farmers x $57.10 saved per farm = $10,278 total saved). We estimate participating 120 goat producers (averaging 10 adult animals¬¬¬ and 20 kids per farm) prior to training conservatively would have spent $177.20 per year ($1.60 per adult x 10 x 2 times per year + $2.42 per kid x 20 kids x 3 times per year) on deworming their entire herd at least twice for adults and three times for kids. Due to a faster metabolism, goats require 1 ½ - 2 times the recommended dose/dewormer. Now after training, participating goat farmers? potential total annual deworming costs may have been reduced to only $53.20 (3 adults x $1.60 each x 2 times per year + 6 kids x $2.42 x 3 times per year = $). Therefore, deworming trainings potentially saved participating goat farmers $124 per farm ($177.20 prior cost - $53.20 actual cost). The combined 120 participant goat farms? savings totals $14,880 per year (120 goat farmers x $124 saved per farm = $14,880 total saved). The total saved as a result of deworming trainings for Virginia goat and sheep farmers is potentially $25,158 in 2018.

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Both communal and individual gardening as well as urban agriculture enterprises target serious health issues in Norfolk, and will play a substantial role in Norfolk?s resilience. The percentage of Norfolk households that are food insecure is 19%. The percentage of Norfolk residents who are obese is 30%. The percentage of Norfolk residents who have not participated in any physical activity within the last 30 days is 25%. All practical strategies to implant fresh food into Norfolk neighborhoods and to train and educate Norfolk citizens in producing fresh food in their communities are unequivocally considered resilience priorities by both the City of Norfolk and the Virginia Health Department.

The following excerpts from A Green Infrastructure Plan For Norfolk: Building Resilient Communities are relevant and immediate steps for impact laid out by the City of Norfolk: Land Goal 1 ? Objective 6 ? Action 1: Create media campaign about grow local/eat local; Land Goal 1 ? Objective 6 ? Action 2: Plant orchards or food forests in city parks; Land Goal 1 ? Objective 6 ? Action 3: Establish community gardens on vacant lots; Land Goal 1 ? Objective 6 ? Action 4: Consider establishing community farms on larger open spaces and use these to promote healthy eating and education about how to establish gardens

What has been done
Virginia Cooperative Extension in Norfolk has addressed the relevance of local food production in a number of ways. The Extension Master Gardener Program in Norfolk has five approved programs that serve Norfolk in food production education: Community Garden Coaches, East Ocean View Children?s Garden, Fred Heutte Center Square Food Gardens, the Li?l Sprouts School Garden, and the Virginia Zoo demonstration kitchen gardens.

Additionally, Virginia Cooperative Extension has partnered with Eggleston Urban Farm and the Teens With a Purpose Safe Creative Community Space garden to provide volunteers, education and necessary supplies for building the reach of those programs in Norfolk. Both Eggleston Urban Farm and Teens With a Purpose reside in food insecure, poverty stricken communities in Norfolk.

Results
The Extension Master Gardeners in Norfolk accounted for significant impacts in 2018 in the area of food production education. In total, the Extension Master Gardeners worked in this capacity for

980 hours educating a total of 1575 citizens of Norfolk. In the process, they contributed to the integration of food production education into four school curriculums, and the production of 1,200 lbs. of fresh fruit and vegetables.

Eggleston Urban Farm in only its first year of operation, with the help of Virginia Cooperative Extension as a programming partner and resource, generated $8,000 in farm-related revenue via a CSA and farmer?s markets in the community, and has achieved the weekly participation of fifteen community volunteers in the daily farm operations.

Teens With A Purpose made significant strides in its second year of garden management, producing enough fresh vegetables to distribute 170 bags of produce to the community throughout summer and fall. Additionally, Teens With a Purpose has created an urban agriculture internship program in which five community youths are participating in garden management on a weekly basis.

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

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

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

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
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

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Small farm businesses in Virginia must stay up to date on new techniques and methods in order to remain solvent in today?s challenging economy. Current social research informs educators that agricultural communities learn and adopt new production and marketing practices primarily through trusted educational networks, experiential learning events, and one on one information transfer. The VSU Small Farm Outreach Program is aware of this learning characteristic of small farm audiences and has built a trusted educational network that offers small farmers in Virginia educational opportunities and personal technical assistance throughout 74 counties in Virginia in partnership with Virginia Cooperative Extension (Virginia Tech and Virginia State University cooperating) field and campus faculty.

What has been done

In 2018, the VSU Small Farm Outreach Program personnel conducted 128 educational workshops, and 600 one-on-one technical service farmer visits on the following topics:
1) How to obtain USDA-farm programs and services;
2) Farm estate management;
3) Financial and business planning and management
4) Computer technology
5) Production strategies
6) Marketing techniques

Results

In 2018, 1,600 individuals were trained or serviced on USDA programs, farm estate management, financial and business planning and management, computer technology, production strategies, and marketing techniques. As a result of direct educational outreach from VSU Small Farm Outreach Program personnel, 528 participants reported their gross farm income increased by 10 percent or more. With the average reported gross sales income of a Virginia small farm operation at $11,653.00 (USDA Census Data, 2012); a 10 percent increase in participant gross farm income is $1,165.00. Based on reported gross farm income gain of 528 participants, an estimated $615,278.00 in gross sales income was a tangible result of VSU Small Farm Outreach Program 128 educational and 600 technical service activities for 2018.

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

Dairy cow maternal influence on fertility and calf performance

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

At least $100 million are lost annually by U.S. dairy producers due to pre-weaned dairy heifer death losses. The current standard to reduce death losses is to ensure passive transfer of colostral immunoglobulin G (IgG); however, there is only a 4% difference in calf survival between calves that achieve passive transfer and those that do not. Given that 57% of calf mortality is associated with diarrhea and only 50% of deaths are associated with inadequate passive transfer, researchers in the Virginia Tech dairy science department suggest that other maternal and dietary influences (e.g., microbiome, genetics, colostrum components) play an integral role in heifer calf gut health and, subsequently, calf mortality and morbidity. The dam?s vaginal, fecal, and colostral microbiomes are the primary sources of the newborn calf?s gut inoculation, but long-term health consequences of these microbiota on host health have yet to be determined. To address the economic concerns associated with calf health, it is critical to elucidate both the impact of maternal microbiota and diet on biological processes. If this need is not met, calf mortality and morbidity rates will not improve, putting greater pressure on dairy production and profitability.

What has been done

Researchers elucidated the microbial and transcriptomic mechanisms within the maternal reproductive tract that impacts fertility and calf performance. The experiment entailed collecting vaginal, fecal, placental, colostral, and oral samples from dairy cows throughout the dry period and shortly after parturition. Oral and fecal samples were also collected from the calf prior to weaning.

Results

The team determined that proteobacteria (56.82 ± 35.84%) had the greatest abundance, followed by Tenericutes (3.18 ± 4.82%) and other proteobacteria (0.98 ± 0.97%). Proteobacteria were negatively correlated with birth weight (R2 = -0.96 and -0.97, respectively). Decrease in placental growth factors has been associated with pre-term births and lower birth weights; Proteobacteria could be diverting placental growth factors from the calf and negatively impacting prenatal calf growth.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
307	Animal Management Systems
311	Animal Diseases

Outcome #21

1. Outcome Measures

Elucidating environmental influences of bovine dam on calf performance and rumen microbial profiles

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Rumen microbiota represent one potential mechanism influencing a cow?s feed efficiency status. Microbes can be introduced to the rumen via contact between the mother and newborn, vaginal births, exposure to feces, and ingestion of milk. A small amount of milk will leak into the rumen during the first week of a calf?s life, providing an opportunity for microbial innoculation. Anaerobic bacteria increase after wk 1 and again after exposure to solid feed (3 weeks). Though the rumen phylogenic profile of post-natal calves differs from the adult cow, bacterial organisms found in 1 wk old calves such as coliforms, lactobacilli, streptococci, and gram-negative faculatatively anearobic urease-positive rods survive in adult cattle. This suggests that microbes introduced from the dam and/or environment are essential to long-term rumen development and possibly calf performance. Unlike other species, dairy calves are removed from the dam shortly after birth. It is unknown how this practice influences a calf?s rumen microbial profile and the subsequent impact on long-term performance.

What has been done
The long-term goal is to determine if the peri-natal environment in which the calf is initially exposed (i.e., natural birth, c-section, bottle feeding, and probiotics) will impact both the dam's milk composition and subsequently the calf's rumen microbial profile. Virginia Tech dairy and animal science researchers aim to determine breed differences, identify effects of postnatal maternal environment, and elucidate effects of perinatal maternal environment through the analysis of dam milk and calf rumen microbial environment. They are using two biologically different breeds: a British breed ? Angus, and a Continental breed ? Charolais. British and Continental breeds are recognized for differences in growth rates and yield, reflecting an evolutionary divergence in these biological types. Dams are bred to a low or high feed efficiency bull according to the experimental treatments. Milk from the dam (n = 36) of calves is analyzed to determine modulatory effects of dam milk composition on mature calf microbial populations. Milk samples will be collected for analyses to include colostrum, wk 1 and once each month until weaning. Milk component parameters are analyzed.

Results
Based on preliminary analysis, researchers identified that composition of colostrum from Angus heifers differs in calves varying in parturition procedures. For colostrum collected from the fore teats, dams that reared calves via C-section had increased protein and solids non-fat compared to bottle fed and naturally birthed calves. Naturally reared calves had decreased lactose levels compared to calves administered probiotics. Urea levels were increased in calves administered probiotics compared naturally birthed calves for colostrum collected from fore and rear teats. For

the rear teats, colostrum levels for fat tended to be increased for calves administered probiotics. Preliminary data suggests that milk profiles differ for dams among calves varying in rearing procedures. Additionally, it may be possible that differing management strategies may send signals to the dam.

4. Associated Knowledge Areas

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

Outcome #22

1. Outcome Measures

Growing and Selling VSU Introduced Niche Crops Earned $70,000 for Virginia Limited Resource Small Market Farmers

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nearly 1/3 of Virginia?s 44,800 family farms, earn less than $1,000 in sales annually (USDA NASS, 2018). Small farm operations less than 10 acres have the potential to earn significant farm income through direct sales to consumers of unique, niche crops such as fresh ginger and turmeric. Fresh ginger and turmeric are increasingly gaining in consumer demand due to media promotion of validated research on the anti-inflammatory benefits of including fresh ginger and turmeric in a balanced diet. Market analyses determined the US ginger market alone will be worth 4.12 billion dollars by 2020, with the US turmeric market growing to 433 million dollars by 2020. In order for Virginia limited resource limited resource small market farmers to take advantage of the potentially profitable fresh ginger and turmeric market, research, education and extension outreach are needed.

What has been done

In order for limited resource small market farmers to adopt a fresh ginger and turmeric enterprise, the Virginia State University Small Fruits and Vegetable Program conducted both in-field and high tunnel research trials, developed hands-on training videos on production, and conducted a statewide Ginger and Turmeric field day covering topics from medical research, production, marketing, culinary, and value added product development. To jump start the industry, 150 fresh ginger and 150 fresh turmeric potted plants were distributed to interested small market farmers in Virginia. These 50 participating farmers agreed to communicate their post-harvest market data. Test marketing was conducted in both retail and farmers? markets within Central Virginia to determine how best to display, price, and position the fresh products in the marketplace.

Results

As a result of Virginia State University Small Fruits and Vegetable Program research, education and extension outreach efforts, 50 small market farmers grew 750 to 1,050 pounds of fresh ginger (150 plants distributed x average yield of 5 to 7 pounds per plant) and 300 to 450 pounds of fresh turmeric (150 plants distributed x average yield of 2 to 3 pounds per plant). Prior to the VSU introduction of growing fresh ginger and turmeric in Virginia, limited resource, small market farmers were not aware of these niche crops in terms of ease of production and lucrative market potential. In 2018, participating farmers had total gross sales of a minimum of $70,000 ($1,400 of additional farm income for each participating farm) fetching retail prices for fresh ginger in the range of $5.00 to 7.00 per pound; and fresh turmeric ($13.00 to $21.00 per pound). Additionally of the 110 individuals who attended the 2018 statewide Ginger and Turmeric field day, 88 individuals had stated they were considering to grow and potentially sell fresh ginger and turmeric in 2019.

4. Associated Knowledge Areas

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

Outcome #23

1. Outcome Measures

Perfectly portioned, sweet tasting Bluegills (Lepomis macrochirus) may ?Net? Virginia Limited Resource, Small Farmers More Cash

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual

2018 0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia ranks 11th in the nation in aquaculture commodities netting $54,665,000 dollars annually. Within Virginia, there are 80,000 existing farm ponds with the potential to earn small farmers added income by raising fresh fish for sale to consumers. Recently, Virginia legislators approved the production and marketing of bluegills (Lepomis macrochirus) for sale to consumers. Relatively unknown to the mainstream consumer, bluegills are considered very tasty, with a sweet flavor and tender texture. Bluegills are prolific, easy to raise, and their 1 to 1 ½ pound harvest size is perfect to fit in a small frying pan to cook up for a perfect one-person entrée serving. The Virginia State University Cooperative Extension Aquaculture program believes that small farmers in Virginia with existing farm ponds may benefit from low cost cages to grow bluegills for sale as a local fresh fish choice for local food lovers also referred to as ?locavores? for up to $15.00 per pound.

What has been done

To determine the feasibility of raising and selling bluegills utilizing cage aquaculture techniques, the Virginia State University Cooperative Extension Aquaculture established three (3) demonstration sites, one (1) farmer demonstration site, one (1) greenhouse demonstration site, and one (1) research farm demonstration site to raise bluegill in cages, harvest and process for market sales. Production data on optimal cage stocking rate and local pricing data was investigated.

Results

As a result of the establishment of three demonstrations involving the building and maintenance of four (4) cages per farm pond, or 12 total cages, we determined interested Virginia pond owners may have the potential opportunity to raise and market bluegills in Virginia as a local fresh fish to consumers. Participating farmers stocking four (4) cages may have gross earnings of up to $6,000 (4 cages x 100 pounds fish filet per cage x $15.00 per pound) every 16-18 months with minimal costs, with a total of 12 stocked cages, estimated gross earnings for the three participating demonstration sites totals a minimum of $18,000 every 16-18 months.

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 #24

1. Outcome Measures

Applying simple artificial insemination in sheep on small farms

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

What has been done

The VSU Reproductive Physiology Lab has developed a technique of vaginal AI in sheep using liquid semen. Researchers have tested the ?shot-in-the-dark? method extensively under research conditions, addressing all aspects of the artificial insemination procedure, including semen collection, processing and storage, and estrus synchronization, along with the insemination process itself.

In working on the various components of the AI system, scientists tried to keep in mind that each part of the procedure would need to be applied at the farm level at low cost. As a result, we developed a simple semen extender using ingredients available at the local supermarket, milk and egg yolk. Estrus is synchronized using a sheep approved progesterone implant to set up AI, and a simple AI gun is used for actual insemination.

This research developed and validated a system of simple liquid semen vaginal artificial insemination in hair sheep using simple and readily available inputs. Research trials refined various components of the system, and was then validated in on-farm producer trials. Pregnancy outcomes of 40% to 60% were achieved and compared favorable to systems in traditional sheep producing regions in Europe and South America.

Five trials were conducted on Virginia hair sheep farms in October of 2014 and 2015 during peak seasonal breeding. To synchronize estrus, producers inserted CIDRs (controlled internal drug release devices) into ewes for 10 days, then removed them 48-hrs before AI. The morning of

insemination, semen from hair sheep rams was collected at VSU using an artificial vagina, then extended to 250 million sperm/ml and packaged into 0.5 ml color-coded straws. Semen was placed in coolers with blue ice for transport to cooperating farms.
Between 5 and 20 ewes were inseminated at each farm using semen from multiple rams and a standard insemination gun for AI without the use of a speculum. At the initial insemination, cooperating farmers were trained in the technique and conducted either one or two additional inseminations later on their own. Pregnancy was determined via transrectal ultrasound 22 days after AI at a return visit. Pregnancy rates ranging from 40% to 67% were achieved on the various farms, and compare favorably with liquid semen AI outcomes in Europe and South America where these systems are more common.

Results
Use of liquid semen vaginal AI can be a practical and effective tool to introduce genetic material to small sheep farms without the movement of live rams. On-farm trials indicate that results using this technique compare favorably with those obtained in larger scale operations in more traditional sheep producing regions in the world.
To achieve satisfactory outcomes, the technique should be applied during the breeding season, and using mature ewes. Additional research is needed to extend storage of semen for up to 18-24 hours to allow for shipment of semen with overnight carriers. This would vastly increase the impact by allowing wider application of the technique across geographically distant areas. The VSU team is currently working on simulated overnight shipping and will validate their findings in on-farm trials.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
307	Animal Management Systems

V(H). Planned Program (External Factors)

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

Brief Explanation

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: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	3.2	0.0	10.2	1.0
Actual Paid	3.6	0.0	4.6	1.0
Actual Volunteer	12.0	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**
68413	0	59545	173969
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
131571	0	142688	561588
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
273882	0	779044	258173

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

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4830	112	82	322

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

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	0	11	11

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
2018	7

Output #2

Output Measure

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

Year	Actual
2018	16

Output #3

Output Measure

- Number of peer reviewed journal articles.

Year	Actual
2018	11

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	Vaccine development against porcine reproductive and respiratory syndrome and porcine epidemic diarrhea virus

Outcome #1

1. Outcome Measures

Increase farm profitability due to more energy efficient practices

Not Reporting on this Outcome Measure

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
2018	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. Virginia Tech Extension and Research faculty J. Ogejo, J. Ignosh and M. Reiter have 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 larger team, including Ignosh and Reiter, have assessed systems at 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. 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.

With resources from NRCS, investigators initiated activities to assess performance of novel emissions abatement systems developed by two technology providers and evaluated at host-farmer sites to use the project data to develop farmer BMPs for thermal conversion technologies (Reducing Air Emissions from On-Farm poultry Litter-Fueled Energy Systems, NRCS Conservation Innovation Grant).

Results

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 poultry farmers by increasing their nutrient and energy management alternatives.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The U.S. forest products industry employs over 1 million people and produces thousands of paper, fiberboard, lumber and engineered wood products. Xylem is the wood-forming tissue in plants and hence is the raw material for the forest products industry. It is the structure, arrangement and relative proportions of the xylem cell types, that determine the physical properties of woods and hence their suitability for specific applications. There are many gaps in our knowledge of the genetic mechanisms that regulate wood formation.

What has been done

Virginia Tech faculty member, Dr. Eric Beers, uses Arabidopsis and poplar to study wood formation. Arabidopsis is a good choice for such studies because its genome has been fully sequenced and several unique resources have been developed for facilitating rapid characterization of genetic mechanisms. Poplar is a model for forest products research. Its genome has been sequenced. For the poplar work, Dr. Beers and colleagues were supported by a feedstock genomics grant from the Department of Energy to study poplar protein-protein interactions and their integration into woody biomass signaling networks. Additionally, we are currently supported by USDA-NIFA to study the roles of sugar signaling genes in woody biomass production.

Results

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The U.S. forest products industry employs over 1 million people and produces thousands of paper, fiberboard, lumber and engineered wood products. Xylem is the wood-forming tissue in plants and hence is the raw material for the forest products industry. It is the structure, arrangement and relative proportions of the xylem cell types, that determine the physical properties of woods and hence their suitability for specific applications. There are many gaps in our knowledge of the genetic mechanisms that regulate wood formation.

What has been done
Virginia Tech researcher, Dr. Eric Beers, and colleagues use Arabidopsis and poplar to study wood formation. Arabidopsis is a good choice for such studies because its genome has been fully sequenced and several unique resources have been developed for facilitating rapid characterization of genetic mechanisms. Poplar is a model for forest products research. Its genome has been sequenced. For the poplar work, the researchers were supported by a feedstock genomics grant from the Department of Energy to study poplar protein-protein interactions and their integration into woody biomass signaling networks. USDA-NIFA grant support provided funding for studying the roles of sugar signaling genes in woody biomass production.

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

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology

402 Engineering Systems and Equipment

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Necrotic enteritis (NE) continues to present major challenges to the poultry industry while the etiologic agent (Clostridium perfringens) is the fourth leading cause of bacterially-induced food-borne illnesses in the US. Probiotics or direct fed microbials (DFM) applied to poultry feed during NE challenge have beneficial effects in helping reduce mortality and lesion scores in the small intestine. This may partially be due to increased expression of the tight junction proteins claudin-3 and ZO-2 thus promoting gut integrity, as C. perfringens toxins disintegrate those proteins increasing the paracellular permeability of the gut.

What has been done
Virginia Tech researchers, Dr. R. Dalloul and colleagues, investigated the effects of an array of commercial direct-fed microbials on performance, pathology, and expression of immunity markers and tight junction proteins (claudin-1, cluadin-3, ZO-1, and ZO-2) in response to a necrotic enteritis challenge in broiler chicks. A unique naturally occurring necrotic enteritis model is employed via spraying high dose coccidiosis vaccine (day 1) and manipulating the environment as predisposing factors. A week later, birds are necropsied and sampled at the onset of necrotic enteritis.

Results
In a recent study, the DFM and Virginiamycin control groups had significantly reduced mortality and lesion scores in the duodenum and jejunum (P=0.006 and P=0.04, respectively) compared to the no-additive control birds. Expression of claudin-3 was higher (P=0.03) in the DFM-supplemented birds compared to controls. Further, despite similar levels for claudin-1 and ZO-1, expression of ZO-2 tended (P=0.06) to be higher in the DFM group than in the control birds. These outcomes suggest that DFM in poultry feed may provide some protective mechanisms.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Vaccine development against porcine reproductive and respiratory syndrome and porcine epidemic diarrhea virus

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Porcine reproductive and respiratory syndrome (PRRS) and porcine epidemic diarrhea virus (PED) are highly transmissible diseases in pigs. PRRS is characterized by reproductive disorders in sows, and respiratory distress and mortality in young pigs. PED causes diarrhea and vomiting, and death of 50-100 percent of infected piglets. In the US alone the economic losses caused by PRRS amount to more than 560 million US dollars every year. Vaccination is the most effective method of preventing infectious diseases. Currently, killed-virus and modified-live vaccines are used clinically to control PRRS and PED. However, both types of vaccines have inherent drawbacks. The unsatisfactory efficacy and safety of current PRRS vaccines drives the development of novel vaccines against PRRSV. Subunit vaccines, which eliminate the safety concern on virulent reversion of modified-live vaccines and allow the immune system to be focused on protective B cell or/and T cell epitopes in a particular viral protein, are the major focus.

What has been done

Virus-like particle (VLP) based vaccines are gaining increasing acceptance compared to subunit vaccines, as they present the antigens in more veritable conformation and are readily recognized by the immune system. Virginia Tech biological systems engineering faculty, in collaboration with veterinary medicine and animal science faculty, use Hepatitis B core antigen as a carrier protein to display selected immunogenic epitopes from various viral proteins. E. coli was selected as the expression host due to its low cost of production and high level of protein expression. The protein

was successfully expressed, and processes to purify the proteins from the inclusion bodies have been developed. The purified proteins are to be tested in mice for immunogenicity.

Results

Hybrid HBcAg VLPs were generated by fusion of the selected protective epitopes of PEDV and expressed in E. coli. Purification protocols were
developed to obtain hybrid HBcAg VLP proteins from the inclusion bodies. These hybrid HBcAg VLP proteins self-assembled to VLPs. Those vaccine candidates will be first tested in mice to study their immunogenicity. The most promising candidates will be studied in pigs for virus protection. Researchers conducted several animal trials to study the VLP based vaccines against PEDV. Our results showed the VLP based vaccines, if incorporated with properly selected epitopes from PEDV at selected location in the backbone protein (HBcAg), can elicit virus neutralizing antibodies. It shows that this vaccine strategy has bright future as effective vaccine against PEDV.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
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 # 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: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	34.3	1.0	0.0	0.0
Actual Paid	39.7	1.0	0.0	0.0
Actual Volunteer	559.0	21.0	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**
338155	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
650335	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1353762	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

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	19599	96258	2177	199

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

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	3	9	12

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
2018	25

Output #2

Output Measure

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

Year	Actual
2018	471

Output #3

Output Measure

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

Year	Actual
2018	179

Output #4

Output Measure

- Number of participants who report new leadership roles and opportunities undertaken

Year	Actual
2018	10

Output #5

Output Measure

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

Year	Actual
2018	5

Output #6

Output Measure

- Number of civic engagement events held

Year	Actual
2018	1

Output #7

Output Measure

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

Year	Actual
2018	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	Establishing the Dorey Park farmers? market: A model partnership with the Henrico Parks and Recreation Department

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Grayson County Administration initiated the formation of the Grayson County Agriculture Advisory Committee in 2017 largely as a result of the demonstrated importance of the farm and forestry sectors in the local economy. This was a priority strategy within Grayson County?s Comprehensive Plan, and Extension was asked to lead this effort due to Extension?s unique expertise in the agriculture and natural resources arena. The committee would provide agricultural policy recommendations to county leadership for consideration.

What has been done
Grayson County Agriculture Extension Agent was tasked with recruiting the first Grayson County Agriculture Advisory Committee, and to chair the committee. Grayson County Board of Supervisors approved the 12-member committee representing all farm segments and the various geographical regions of the county. Local government officials were also part of the committee. The first organizational meeting was held in February 2018, and then monthly thereafter. The Agriculture Agent set the agenda, kept minutes of the meetings, and provided a mid-year report to the Board of Supervisors.

Results
In February, the committee reviewed the Grayson County Comprehensive Plan to get an idea of its purpose and directives. By April, the committee had outlined the strengths, weaknesses, opportunities and threats facing agricultural development in the county, and generated a ?wish list? of activities that were broadly categorized into four priority areas: agriculture education, agriculture economic development, improved internal and external communication related to agricultural opportunities, and wildlife issues. Two actionable items emerged right away. The first action established the Grayson County Fair in conjunction with the existing youth

livestock show. The goal of the County Fair was to further showcase the importance of agriculture within Grayson County in conjunction with Extension?s existing Grayson Agribusiness Showcase. A small group of volunteers from the committee organized and promoted the addition of produce exhibits and a small agricultural expo to the livestock show. Attendance increased from nearly 100 youth and parents to over 400. By the end of 2018, a County Fair Committee had been established to move the event forward in future years.
Second, the committee established a proposal for a county-staffed Agriculture Economic Development Specialist. The duties were determined by the committee to promote and advance Grayson County agriculture interests under the direction of Grayson County administration, and in coordination with local Extension. Funding for the position will be included in budget discussions during 2019.

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
2018	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

Strategic and Project Planning training course were taught in Charlottesville, Christiansburg, Petersburg, Prince William and Richmond to 60 participants. Further, participants have often sought additional tools for decision-making options and expressed the desire to practice them in a hands-on session. As a result, the Tools of Facilitation one-day workshop was developed in collaboration with the University of Virginia?s Institute for Environmental Negotiation. An initial workshop was delivered to 26 participants in Richmond. Many times Extension is asked to have a one-on-one consultation with groups to assist in outlining discussion strategies. Responding to these requests, more than 70 decision-making and planning conversations were held with: agricultural entrepreneurs, agritourism groups, Virginia Farm Bureau, Danville Life Saving Crew, Virginia Bank & Trust leadership council, Dan River Implementation group, the Virginia Horse Council, Pittsylvania County Library, The Virginia Tobacco Commission on the Centers of Excellence, Cumberland County Board of Supervisors, Danville Concert Association, the Southern Piedmont AREC, the Tidewater AREC, Master Gardeners of Northern Virginia, Hampton Roads Disabilities Board, Virginia Department of Behavioral Health and Disabilities Services, and Olde Dominion Agricultural Foundation. The facilitation team also partnered with the Virginia Agricultural Experiment Station to plan and moderate the 2018 Virginia Agricultural & Natural Resources Initiatives Summit where over 100 state private and public industry leaders gather to discuss industry issues. Community planning, decision-making, and facilitation services programming for planning and decision-making and deliver facilitation support to agencies, organizations, and community groups in Virginia cities and counties. A team of nine agents and two specialists developed, coordinated, and delivered five, 15-hour, interactive Strengthening Your Facilitation Skills (SYFS) Training workshops during 2018. Holding classes in Fauquier, Galax, Norfolk, Prince William and Norfolk, our team equipped 145 individuals with the skills of facilitation. In 2018, the Virginia Chapter of the American of Planners Association approved all of the facilitation and planning trainings for CEU awards.

Expanding on the facilitation training and developed in response to requests, five sessions of the 6-hour addresses VCE focus area, ?Cultivating Community resiliency and Capacity,? and provides a strategy to achieve Goal 2: Develop and deliver educational programming to improve capacity among community members to engage in community planning, decision-making, and community leadership.

Results

The Strengthening Your Facilitation Skills training delivered throughout the Commonwealth resulted in 90% of the 145 individuals reporting increased ability to facilitate group discussions. Of those completing the training, 98% indicated that their understanding of facilitation values and principles increased, and 97% reported the training was either helpful or very helpful for the individuals? particular needs. In addition, 100% of the respondents reported being equipped with new or improved planning skills and tools as a result of attending the Strategic and Project Planning trainings. And 80% of respondents from the initial Tools of Facilitation workshop indicated they will definitely adopt one or more of the tools discussed during the training. Beyond the training and because of the recommendations of Extension agents and Extension?s respected reputation, more than 16 organizations/agencies were led through the development and/or implementation of a facilitated decision-making process in 2018 resulting in a strategic plan or a clearly defined organizational focus and/or a plan of work. Evaluation comments indicated that 92% of the groups responding ranked Extension?s training and facilitation as ?exceptional? (the highest ranking) and 100% reported that the goals of the session were accomplished. One groups indicated that the facilitator?s ?suggestions and guidance during the planning stages were critical to the program success.? Another group reported ?I don?t think we could have come close to getting done in two hours without ?facilitator?s? orchestration.? 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
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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia leadership searches for tools to prepare volunteers, civic leaders, and elected/appointed officials to be the force for positive change within their communities. 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.

?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, and educational programs can respond to this issue by empowering the citizens. 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. 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 2018, three, two-day trainings were offered as part of the Virginia Association of Counties (VACo) Certified Supervisor program. The strong support of VACo?s leadership led to an additional training in 2018 on the impact of economic transitions that was presented at the VACo annual conference. Extension?s leadership program portfolio includes a leadership training, Leading while Managing: Practicing leadership, communication, and building proactive Team, delivered for the 2018 Mid-Atlantic Horticulture Short Course/Crew Manager Certification. This training is a 6 hour interactive course completed by landscapers from throughout the Commonwealth. In addition, leadership training is delivered as two of the six modules for the Virginia Farmers Market Manager Certification program (Market Rules and Governance and Conflict and Controversy). Extension continues to train its agents on the grassroots leadership program, Innovative Leadership: Building Community Connections, and offered one training on this program during 2018.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.?USDA Knowledge Area: Topic VIII. Families, Youth, and Communities - #805 Community Institutions, Health, and Social Services

Results

In the VACo Certified Supervisor program, 100% of the county supervisors completing the 2018 courses reported an increased understanding of their leadership role, knowledge of county government, and role in engaging the public in issue-based discussions. Individuals completing the horticulture short-course are required to complete a manager certification exam. In 2018, 100% of those taking the exam were successful in receiving the certification.
Extension agents have access to leadership development tools that can be used as part of on-going programming or a specific trainings for community groups. Overall, each group who participated in leadership training offered by Extension report an increase in confidence in serving in leadership and decision-making roles.

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Changing the structure of Community, Local, and Regional Food Systems (CLRFS) team from a Steering Committee of VCE faculty to an official VCE Program Team interrupted ongoing projects and networks. This change resulted in the reorganization of the faculty and the desire to establish revised objectives for the group.

What has been done
The CLFRS Program Team established a management team to focus on soliciting and incorporating input from current and potential Program Team members. To increase visibility of the CLRFS work, we developed a social media campaign that focused on a CLRFS Local Food Matters Photo Contest for VCE faculty and staff along with their community partners. In addition to visibility of the local foods efforts, we established a schedule of CLRFS Field Trips to increase participation and interest in local foods works and the Program Team. Both activities were promoted on our Facebook page and through emails to VCE Google groups.

Results
The CLRFS Local Food Matters Photo Contest ran from June 1 to November 2, 2018, with the top four images in each of four categories (Fun, Freshness, People, Innovation) selected for a 2019 CLRFS calendar. We had 63 submissions for the calendar. Fourteen were selected for the calendar with the overall winner on the cover. The prize for the overall winner, Kelli Scott of Montgomery County VCE, is a professional video by the CALS Communication and Marketing Group of the local foods event of the winner?s choice. The calendar is being shared with CLRFS Program Team members and our community partner while the images submitted for the contest continue to be shared on our Facebook page. To increase participation and interest in local foods works, the CLRFS Field Trips were designed to involve and enlighten regional VCE personnel and their community partners about local foods events, operations and community groups in a given area. Two of these were held in cooperation with other events, one in Rhappahannock at Sunnyside Farms and one at Virginia State University with the summer meeting of the Virginia Beginning Farmer and Rancher Coalition. Kathleen Reed, Roanoke VCE organized visits to multiple sites in Roanoke including Carilion's Urban Farm, Morningside Community Garden (run

by the Roanoke Urban Garden Association), LEAP community kitchen, George Washington Carver Community Garden (supported by Apple Ridge Farms), James Madison Middle School?s teaching garden, Andrew Lewis Middle School?s teaching garden and food pantry, and the LEAP Mobile Market. Kenner Love and Eric Bendfeldt organized the Field Trip in the Shenandoah Valley including stops at the Shenandoah Produce Market, Valley Farming LLC, and Route 11 Potato Chips. The Field Trips included pot lucks or meal stops (Local Roots in Roanoke and A Bowl of Good in Harrisonburg) focused on the use of local foods. Over 20 participants enjoyed the tours and local food opportunities offered during 2018. Photos and stories from these field trips also were shared on our CLRFS Facebook page as part of our social media campaign. This page ended the year with 218 likes compared to 145 likes in 2017.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Situation analysis conducted by Chesterfield Cooperative Extension in 2018 identified youth issues as a top-five priority issue, which is consistent to concerns expressed in the 2013 situation analysis for Chesterfield as well. Specifically, teen leadership, decision-making and life skills, youth violence, and teen volunteerism/civic engagement were highlighted. The 2018 Youth & Family Indicators Report (Chesterfield Youth Planning Commission) presented a Risk and Protective Factor Model that showed youth are less likely to engage in risky behaviors if they 1) have a sense of ?right? & ?wrong?, 2) associate with peers engaging in pro-social behavior, 3) participate in positive school/community activities, 4) feel rewarded for working hard in school and the community.

What has been done

In 2013 a 4-H Teen Club was created in Chesterfield County to extend camp counselor training to a year-round leadership program focused on life skills and building friendships in a safe environment. Since that time, this program has evolved to provide teens with numerous leadership opportunities at the local, district and state level as well as service to their community. The 4-H agent also collaborated with specialists and agents across the state to create a Teen Think Tank focused on enhancing the quality of teen programming across Virginia.

Results

In 2018 there were 52 Teen Club members who attended monthly meetings, service projects, and volunteered at 4-H camps, outreach events, awards, & contests. During 2018 the members of the Teen Club contributed 3,300 volunteer hours toward the 4-H camping program alone. Members contributed an additional 120 hours through service projects, day camps, and community events. Based on the current value of a volunteer?s time ($24.69/hour; 2018 Independent Sector data) the teens provided more than $84,400 of donated support critical to 4-H programming in Chesterfield. In 2018 Chesterfield teens also held multiple leadership positions within the State 4-H Cabinet. One teen completed her term as Cabinet mentor, another completed her role as Southeast District Ambassador, and a third teen was newly elected as District Ambassador for the 2018-19 term. Chesterfield Teen Club members were selected to the 2017-18 Teen Excellence Leadership Institute (n=2) and to attend 2018 Citizenship Washington Focus (n=4) through a grant sponsored by Altria. Under my leadership, these teens have represented 4-H interests at such events as 4-H Day at the Capitol and the Virginia Agribusiness Banquet. We have met with local and state representatives and even the Governor of Virginia. The 4-H Teen Club created three different digital media pieces for entry at the statewide Virginia Youth Voices (VYV) event. Two of these pieces were used for 4-H promotion at parent orientation for camp as well as on the Chesterfield extension website. The Teen Think Tank team, led by specialist Dr. Tonya Price, distributed a statewide survey to currently active teens and their parents/guardians to gather insight on how they became involved in 4-H, what keeps them engaged in the program, what they have learned as a result of their participation, how they are utilizing what they have learned, and their familiarity with the variety of opportunities available to teen 4-H members. In late 2017, data from 233 teens and 388 adults was collected across all four districts with 71 of our 106 units in Virginia participating. The age range of teen respondents was 13-19 years old. Results from this study were used to determine trends for future teen 4-H programming and the completion of two peer-reviewed VCE publications for 2018 (Publication 4H-786, The Value of Teen Leadership and Publication 4H-785, The Value of Teen Leadership Quick Guide). Our workshop proposals for ?Teens as a Valuable Resource? and ?Connecting with Teen Audiences? were both accepted for delivery at the Joint Council of Extension Professionals (JCEP) conference and VCE in-service, respectively, both of which will be held in February 2019.

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
2018	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. 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.

What has been done
During 2018, Virginia Cooperative Extension professionals delivered leadership programs throughout the Commonwealth, nationally, and internationally. Program topics included public issues, team building, organizational leadership, partnership development, leading as an elected official, education, positive communication, and leading peers. For example, the Virginia Association of Counties (VACo) Certified Supervisor program offers three 2-day classes each year, and the strong support by VACos leadership led to an additional training in 2018 entitled Community Transitions: How change impacts people and community well-being that was presented at the VACo annual conference. VCE's leadership training and counsel supported Virginiaâ??s farmersâ?? market boards of directors, Master Gardeners, Extension Leadership Councils, county-based agricultural groups and agricultural advisory committees, Virginia Master Naturalists, Virginia Beginning Farmer program, 4-H Master Volunteers, regional health coalitions, the George Washington Carver Agricultural Research Center, elected officials, county staff, county boards and committees including emergency management teams and resource boards, as well as regional groups (Twin County Leadership Initiative).

Results
Moving from learning to taking action, eight of 14 participants in the Twin County Leadership Initiative stated that at as result of the training, they will take a more active role in community and/or local government involvement to "serve to make change". Participants also noted that

because of the training, they know how to better communicate with others, and will embrace and recruit team members with differing ideas and strengths in order to have a more highly functioning team. One participant currently serves in an elected position and credits this program with that success. The Twin County Leadership Initiative originally began in 2008 using the Innovative Leadership: Building Community Connections curriculum. One of this year's organizers, Mrs. Brenda Sutherland was a participant in the inaugural class taught by Extension in 2008. She not only organized this year's event in her role as Director of the Crossroads Institute, which helped initiate TCLI in its inception, but also serves Grayson County as Chairperson of the Board of Supervisors. This was her opportunity to take the lessons she learned and pay it forward to the next generation of community leaders. Also, one of the other panel members was the newly elected Clerk of Court in Carroll County, Mr. Gerald Goad. He was also a graduate of the TCLI program when Extension's curriculum was used exclusively for the course. He mentioned how TCLI and his Extension instructor motivated him to get involved in community service. He indicated that if not for his participation in this very program a few years ago and his Extension instructor, he would not have considered running for, nor expected to win such an important elected county position. Following the work with the Department of Defense Education Activity (DoDEA), a participant shared the following: "excellent presenters - knowledgeable, well prepared, with good rapport with your audience - the 30,000 foot view of the process was helpful â?¦ (if a little frustrating)." In addition, we had verbal feedback from one participant who indicated she was more hopeful about the future of DoDEA because our work had allowed the group to successfully coalesce around a shared vision. A third DoDEA focus group participant shared: "I think that was a really positive change that Virginia Tech helped us with this year, was to really revisit the way we track our progress: Look at that tracking progress data, but really reflect on what we've done, lessons learned, and then the way forward.

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
2018	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
2018	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.

What has been done
In 2018, Virginia Cooperative Extension engaged over 30,000 volunteers in diverse programming efforts resulting in a reported 1,072,813 hours of service. Four Master Volunteer programs (Extension Master Gardener, Virginia Master Naturalist, Master Food Volunteers, and Master Financial Educators) representing over 7,300 volunteers, provided expanded education, outreach, and programming efforts, reporting over 612,000 hours of service. The Virginia 4-H program engaged more than 15,000 adult and teen volunteers to support the development of life skills in youth development programming.

Results
Key volunteer contributions from 2018 include: In 2018, VMN volunteers contributed more than 43,000 hours of stewardship to improve local natural resource conditions on more than 400 sites through invasive plant management in parks, planting of habitats for pollinators and other wildlife, trail maintenance of hundreds of miles of trails, and litter cleanup events. Virginia Master Naturalist (VMS) volunteers also contributed more than 64,000 hours of time to dozens of citizen science studies of birds, phenology, mammals, butterflies, stream health, and more. Among these was a new set of bat monitoring studies aimed at improving understanding of bat abundance and diversity in Virginia. Volunteers in four VMN chapters worked with partners such as the Virginia Department of Game and Inland Fisheries and the North American Bat Monitoring Program to develop study protocols. Throughout the summer, they visited field sites regularly, recorded bat echolocation calls using bat detectors, and identified them using computer software. The data are shared with scientists to help inform bat conservation efforts. More than 600 trainees participated in Extension Master Gardener trainings and joined forces with more than 3919 currently active Master Gardeners, 326 Emeritus, 480 Interns, and 286 Trainees. In 2018, 239 local Master Food

volunteers reached 16,746 adults and youth statewide, contributing 3,123 volunteer hours through demonstrations/displays at farmers' markets, home food preservation workshops, health/wellness programs/fairs, nutrition/healthy cooking programs and physical activity promotion programs. Some specific Master Food programs taught by volunteers included (but not limited to) Balanced Living with Diabetes, Diabetes Prevention program, Teen Cuisine, Reality Store, Poverty Simulation, Healthy Weights for Healthy Kids, LIFT strength training program, Kids Marketplace, ServSafe, and the Family Nutrition Program. 15,735 adult and youth volunteers supported 4-H members to increase confidence, competence, connection, character, and caring among Virginia youth in rural and urban communities. Master Financial Education Volunteers were trained to provide community-based workshops in personal finance, budgeting, and financial counseling. The economic value of the reported volunteer time is more than $28.7 million (based on an hourly rate for Virginia of $26.75 from the independent sector: https://www.independentsector.org/volunteer_time). This is a tremendous in-kind contribution and return on investment to the Commonwealth of Virginia

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

Not Reporting on this Outcome Measure

Outcome #10

1. Outcome Measures

Establishing the Dorey Park farmers? market: A model partnership with the Henrico Parks and Recreation Department

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

While the number of farmers markets are growing, the USDA (2017) reports sales are slowing. With the increase in the volume of farmers markets operating in a specific geographical area and given the relatively stable customer base, this translates into lower profit margins for participating farmers. The reason being that the same amount of customer dollars are being spread out amongst more farmers markets in a given area. This disturbing economic trend is important for extension professionals to be aware of and to incorporate into any planning of new farmers markets in their area. One bright area of farmers? market development is the non-obvious pairing of non-traditional customers with an alternative market setting which may open up unexpected profitability in the farmers? market downturn.

What has been done

In spring 2018, the Dorey Farmers Market, Inc. (a 501(c) (3) tax-exempt organization) approached Henrico Cooperative Extension agent, Ed Olsen to assist in determining the feasibility of establishing a farmers? market at Dorey Park, a sports park operated by the Henrico Parks and Recreation Department. The unexplored idea was to take advantage of the thousands of families who attend sports events each Saturday, a relatively untapped farmers? market audience. To provide technical support, VCE agent Olsen contacted Dr. Theresa Nartea, VSU marketing and agribusiness extension specialist to inform the planning process and develop a survey instrument which she would analyze and interpret in order to assess the potential for successful planting of a new farmers? market venue in Henrico, VA.

Results

As a result of survey findings, it was determined by community market planners to move forward in the establishment of the Dorey Park Farmers? Market. The establishment of this new farmers? market has directly benefitted 33 farm, food artisan, and craft related small businesses, who have sold directly to thousands of sports event attendees over the market season beginning June 2nd and ending October 27th (Number of Saturdays = 22). Based on minimum estimated earnings, market sales ranged from a low of $72,600 (33 vendors x $100 sales/event x 22 events) up to $181,500 (33 vendors x $250 sales/event x 22 events).

4. Associated Knowledge Areas

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

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: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	17.3	4.0	40.8	3.0
Actual Paid	19.3	5.5	82.2	4.0
Actual Volunteer	1928.0	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**
1217749	173427	1059898	695877
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
2341958	132157	2539851	903971
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
4875108	44726	13866992	198423

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

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	109406	1143330	2300404	1726

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

Patent Applications Submitted

Year: 2018

Actual: 2

Patents listed

A natural frozen mashed potato stabilized with a mixture of cryoprotectants and preparation procedure, Use of hispidulin as a treatment for type 2 diabetes

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	16	27	43

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Output #2

Output Measure

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

Output #3

Output Measure

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

Output #4

Output Measure

- Number of youth and families participating in sessions on the causes and effects of chronic diseases, including obesity and sedentary lifestyles.
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
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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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	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 2018, more than 1 of 4 of Virginiaâ??s youth were overweight and obese, and more than 1 in 10 adult Virginians had type 2 diabetes. To equip Virginiaâ??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 51 agents, who were assisted by 239 Master Food Volunteers, and 971 educational partners trained by FCS SNAP-Ed agents. Programs reached 77,651 Virginians in 2018. 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 20 agents implementing two evidence-based programs for youth: Health Rocks! and Teen Cuisine. 15,093 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,

training to support implementation of the Yoga for Kids program was delivered to 30 4-H Agents and 4-H Center Faculty. To support these efforts, faculty procured $127,500 in extramural funding.

Adults. VCE specialists supported agents implementing four evidence-based interventions for adults (see below). These programs aimed at preventing diabetes and increasing physical activity were delivered 37 times to 443 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. SNAP-Ed agents distributed workplace wellness resources to clients. Extramural funding to support these efforts exceeded $5,436,000, including $2,500,000 million for obesity prevention.

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: The Balanced Living with Diabetes was offered in four counties in 2018. Fifty-three residents age 22 to 86 years benefited from the program. We target populations most at risk for diabetes and poorer outcomes including those of lower educational attainment and socioeconomic status, which made up half of our participants. Participants significantly increased the practice of lifestyle habits essential for diabetes control including eating a balanced diet with appropriate portions of fruits and vegetables, establishing the habit of exercising daily, and monitoring their blood sugar regularly. They also experienced an average body weight loss of 2% and A1c reduction of 0.4%, which is important to blood sugar control. 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: Virginia Extension Agents in five counties began a National DPP program in 2018. Forty-six Virginia residents with prediabetes enrolled in the programs that reached a diverse audience of men and women ranging in age from 38 to 85 years and with a racial composition of 41% African American and 59% white. At this point in the programs, participants have lost an average of 5 pounds and 3% of body weight. A loss of 5% of body weight is associated with a 58% reduction in the risk of moving from prediabetes to diabetes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

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
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	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 $1,343,592 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. Historically Extension educators have been 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) provided food preservation trainings and support across the state including these sessions: 2 - General canning classes presenting beginner canning information including (but not limited to) differences between high and low acid foods and how to select the best preservation methods for each food; 2 ? Canning Demonstrations (Apple Butter at Amherst County Fair and Peaches at Glascock Orchards); 1 - low acid (meats, fish, etc?) canning classes demonstrating hands on canning using a pressure canner; 1 ? dehydration workshop; 5 - dial gauge inspections for accuracy.;79 - one-on-one individualized home preservation support; 39 ? individualized home preservation support via phone

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. 112 participants increased their knowledge in the following areas: 23 - learned how to can low acid foods using a pressure canner; 112 - learned how to can high acid foods using a boiling water bath canner; 45 - learned the importance of pH in determining the acidity of foods; 23 - learned how to adjust for altitude when canning; 28 - learned how to dehydrate foods; 23 - learned how to freeze foods; 28 - participants intended to do the following as a result of this training: 28 - can low acid foods using a pressure canner; 28 - use safe food preservation techniques; 25 - freeze more foods; 8 - dehydrate more foods; If a gauge is determined to be inaccurate after testing, the Extension Educator recommends replacement of the gauge and re-testing of the new gauge to ensure accuracy. Of those tested, 5 were inaccurate and recommended for replacement. 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 (or County(ies)) can be $ 6,717,960. Six participants informed me that they had been canning low-acid foods in a boiling water bath and would now use a pressure canner due to the classes, the potential annual savings to the State of Virginia (or County(ies)) can be $ 8,061,552, for a total combined annual savings of $ 14,779,512

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Despite efforts nationwide to reduce foodborne outbreaks, illnesses related to consumption of contaminated food continues to occur. In 2018 alone, there were significant outbreaks associated with consumption of lettuce, ground beef, eggs and breakfast cereal. Between 2013 and 2016, the state of Virginia averaged over 2900 cases of foodborne illness per year. For each confirmed case, there are an estimated 20-38 unconfirmed cases; therefore 59K - 112K Virginians are affected annually. The estimated economic loss in Virginia is between 95 and 183 M per year. Regardless of market outlet requirements and size of farm, access to food safety education is crucial. Training and resources must be up-to-date, relevant to stakeholder audiences, and research-based. Ultimately, stakeholder access to the needed trainings and resources will lead to the adoption and implementation of best practices that reduce microbial risks and strengthen a prevention-based food safety culture in Virginia.

What has been done

Virginia Cooperative Extension (VCE) offers a wide range of national, regional and state specific educational opportunities across the Commonwealth. Each training is tailored specifically to meet specific audience (grower, producer, retailer, consumer etc.) needs. In 2018, the following trainings/ programs were delivered by VCE: New and expanding food businesses: ?Over 350 individuals or small companies were mentored resulting in 358 food products analyzed by the VCE process authority.

Farmers market/direct market food producers: ?357 produce growers and farmers market managers were trained in how to increase the safety of produce sold in the local, direct marketplace. And ?661 additional Virginians learned how to navigate food safety requirements for opening new markets. This included market sector training and handling requirements based on specific buyer policies (including farm to school).

Food service industry: ?402 individuals representing various food service operations (full service, quick service, daycare, assisted living facilities, school food service, volunteer organizations, professional chefs, and regulators who inspect food service operations) were trained in Food Allergy Awareness for the Food Service Industry. And ?1115 food service managers representing 715 different establishments (restaurants, daycares, schools) completed the ServSafe for managers 16 hr certification training.

â??579 food service employees completed the ServSafe for employees training. And ?268 individuals representing 68 different organizations (churches, civic groups, etc.) completed the Cooking for Crowds training.

Fresh Produce Growers: ?39 VCE agents were trained in introductory and advanced Good Agricultural Practices (GAP), an on-farm food safety approach that teaches growers how to identify and mitigate food safety risks. This increased VCE capacity to assist growers in developing food safety plans and work through the GAP certification process. And ?100 growers were mentored on-the-farm in identifying risks, with 53 growers developing food safety plans and passing a third party GAP audit. And ?692 growers, 21 extension agents, and 45 state/county/city officials attended VCE-led information sessions about the new FSMA Produce Safety Rule (PSR). And ?16 Produce Safety Alliance (PSA) Grower Trainings and one PSA Train the Trainer course were hosted across VA, resulting in total of 516 growers trained and 29 new PSA trainers. And ? VCE, in partnership with local growers, hosted a number of â??Educational toursâ?? for Virginia Department of Agriculture and Consumer Services (VDACS) and FDA to allow all parties to interact on an informal basis and learn from each other about navigating PSR enforcement and compliance. And ?7 agents were trained to assist VDACS during On Farm Readiness Reviews (OFRR). 35 growers successfully completed OFRR. And aA pilot water testing project was initiated to provide education and cost share for over 800 production water tests required for the PSR.

Food Manufacturers: ?4 VCE specialists are recognized as lead trainers for the Food Safety Preventive Controls Alliance (FSPCA). The FSPCA oversees the standardized curriculum that is recognized by FDA and required for food producers to comply with FSMA.

And ?102 food manufacturers completed FSPCA training. And ?195 clients representing 50 food processing companies were trained in HACCP or Good Manufacturing Practices (GMP). And ?7 of these food manufacturer trainings were delivered in Spanish.

Aquaponics: ?A session to improve programming and apply for grant funds was held with representatives from the aquaponics industry across VA to address food safety issues related to aquaponics, aquaculture, and hydroponics.

Results

The outcomes from the previously mentioned trainings have been significant, resulting in 1,815 clients receiving certificates from national programs. These were required for them to comply with state and national regulations. Briefly, 949 retailers, 569 produce growers, and 297 food manufacturers were able to maintain their businesses or open new markets as a result of VCE programs. Additional impacts include: ?64 (17%) products evaluated for safety through the Food

Innovation Program required reformulation changes to ensure their safety prior to entering into commerce; ?100% of grower training participants increased their knowledge with an average of 19% increase in test scores. 35 growers went on to successfully complete On Farm Readiness Reviews; ?53% of growers that were mentored in conducting on-farm risk assessments, implementing best practices, and developing food safety plans, passed third party food safety audits, thereby opening new markets for their products; ?Direct market growers intended to implement food safety practices, including enhancing food safety training (72%), improving cleaning and sanitizing methods and facilities (77%), and monitoring storage temperatures (66%), and make improvements in cleanliness for transport to market (64%). The adoption and implementation of best practices reduces risks, thereby strengthening the food safety culture among fresh produce growers; ?Farmers market managers intended to 1) require training/certification for vendors (100%), ask questions of vendors to ensure they are following safe practices on their farms (90%), improve hand washing and toilet facilities (67%), switch to containers that can be easily cleaned and sanitized (100%), improve cleaning and sanitizing methods at the market (94%) and monitor storage temperatures (95%); ?100% individuals completing food allergen training increased their knowledge and confidence in their ability to serve people with food allergies safely. Some of the comments included: 1) â??learned how important it is to read ingredient labelsâ??, 2) â??preventing cross contact is as important as preventing cross contaminationâ??, and 3) â??preparing food for customers with food allergies is not complicated. Additionally, this program was the Southwest District Winner for the 2018 VCE Program Excellence Award for New Initiatives.

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, although longer-term economic or public health impacts of this work are yet to be fully measured. If we estimate that one foodborne illness for every person certified in a food safety program was preventive, VCE programs may have saved VA over 2.9M dollars in healthcare costs. Additionally, the capability to provide trainings in Spanish-language ensure proper understanding and application of food safety systems by the high portion of Hispanic owners and employees working in the food service and food processing industries in Virginia.This multi-leveled approach is cultivating a stronger food safety culture across the Commonwealth, thereby resulting in safer food, starting new businesses, opening access to new markets, and complying with 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 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Maintaining a trained workforce is vital for the prevention of foodborne illnesses our clients in Virginia. Foodborne illnesses (FBIs) significantly affect public health in the United States. The Center for Disease Control estimates that each year about 1 in 6 Americans (or about 48 million people) gets sick and 3,000 die of foodborne illness. Food processors and food retail companies must keep abreast and attain an understanding of food safe handling practices, emerging pathogens, new research, and regulations so that they can remain in business and market safe and quality food products. In addition, the Food Safety Modernization Act (FSMA) added training requirements, thus increasing the need for education of personnel at all levels of the food company. Being able to understand and effectively follow safe food handling and manufacturing practices can prevent the contamination of foods before it reaches the consumer. This is the key to preventing FBIs. Research studies suggest that language barriers can make it difficult for employees to understand and apply these basic safe food handling and manufacturing practices.

What has been done
The Virginia Seafood Agricultural Research and Extension Center (VSAREC) provided 13 food safety trainings and workshops to 195 clients representing 33 food processing companies. Clients included seafood processors, food regulators, and retail industry in Virginia and nationwide. Seven (7) of the trainings and/or workshops, were delivered in the Spanish language. Trainings and/or workshops provided included Seafood HACCP, Good Manufacturing Practices (GMP?s) and Listeria Controls, and ServSafe. Certificates for some of the trainings and Letters of Proof of Training are issued. FDA and the National Restaurant Association nationally recognized certificates. Trainings are supported in part by Virginia Sea Grant funds.

Results
Thru training and education, Virginia Cooperative Extension Specialists, supported by guiding and informative research, supports ongoing efforts by industry and government agencies to prevent and reduce the risk of foodborne pathogens from the farm to table continuum. The emphasis on prevention is consistent with the US FDA Hazard Analysis and Critical Control Point (HACCP) plan systems and FSMA and reflects the FDA's current Good Manufacturing Practice (CGMP) requirements and new requirements for Hazard Analysis and Risk-based Preventive Controls. Participants from the food processing industry and the retail industry can use the gained knowledge to prevent the contamination of the foods they process or serve to the public. Regulators can use the attained knowledge to evaluate food safety plans and sanitation procedures. The capability to provide these trainings and workshops in the Spanish language

ensure proper understanding and application of food safety systems by the high portion of Hispanics employees working in the food industry in Virginia. Research and Extension faculty at the VSAREC, located at the coast of Virginia, cooperate with food science faculty at the Virginia Tech Blacksburg campus to provide training to support the food industry and Virginia food inspectors in the understanding and application of these new regulations.

4. Associated Knowledge Areas

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

Outcome #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.

Not Reporting on this Outcome Measure

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Aquaculture has been the fastest growing animal-production sector in the world increasing at an average annual growth rate of 9% over the last forty years. Despite this growth, the rapid expansion of this industry has not been without issues. For example, disease outbreaks have overwhelmed certain sectors of the industry and have been catastrophic for some. Meanwhile, overuse of antibiotics in aquaculture has its own set up issues from public perception to promoting antibiotic resistant bacteria. Therefore, alternative strategies to the use of antibiotics needs to be explored and developed.

What has been done
Probiotics have the potential to be an alternative to antibiotics for increasing disease resistance of aquatic animals to bacterial pathogens. Accordingly, Virginia Tech food scientists experiments have fed specific strains of probiotics to finfish and shrimp and challenged these aquatic animals (versus a control group, no probiotics) to specific pathogenic bacteria to determine survival, histological, innate immunity, and changes in metabolism responses.

Results
Researchers found that pecific strains of probiotics significantly increased disease resistance of both finfish and shrimp to pathogenic bacteria. Additionally, in finfish, they observed biochemical changes that suggest positive changes in the metabalome and innate immunity of fish. This has resulted in international interest on how to implement this biotechnology at fish farms and aquaculture production facilities. As a result, Virginia Tech hosted a biotechnology session at an international conference in Nevada (February, 2018) which included twelve talks from speakers around the globe.

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

Not Reporting on this Outcome Measure

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Almost one-third of adults in the U.S. and in Virginia are obese (28.9% and 28.5%, respectively). Obesity can result in numerous health and economic concerns. Health consequences include higher risk of heart disease, stroke, type 2 diabetes, and certain types of cancer. Economic consequences include decreased worker productivity and increased absenteeism, costing society $147 billion each year (based on 2008 data). Likewise, an obese person has annual medical costs that are $1,429 more than his or her normal weight counterpart. Effective community-based programs are needed to improve dietary quality and physical activity, the contributors to obesity, in order to lower obesity rates and address this public health concern. Overall, Americans do not meet national recommendations for vegetables, fruit, dairy, or whole grains, and they exceed recommendations for sodium, saturated fat, refined grains, solid fats, and added sugars. Additionally, most Americans do not achieve recommended physical activity levels and exceed recommendations for sedentary activity. Although poor diets and physical activity can occur at all income levels, limited resource families are especially vulnerable. Additionally, food preparation and cooking skills are lacking.

What has been done
The core of the Virginia Family Nutrition Program, which includes the Expanded Food and Nutrition Education Program (EFNEP) and the Supplemental Nutrition Assistance Education Program (SNAP-Ed), is food, nutrition and physical activity programming delivered by Peer Educators (Program Assistants), to limited income youth, adults and families. Peer Educators are considered indigenous to the population, meaning they have a similar social and cultural background, attitudes, and values, and can contextualize information to be as meaningful as possible to program participants. All obesity-prevention curricula are evidence-based, learner-centered, and include experiential learning opportunities, such as food preparation, to promote food resource management, nutrition and dietary quality, and physical activity. A minimum of six

lessons are taught to maximize the potential for behavior change. The Peer Educators also serve as educational and social networks among vulnerable populations by providing referrals to other partner agencies that address food and other needs of their participants. Programs are offered at a wide range of settings, including community centers, churches, elderly service centers, and emergency food assistance sites. Partnerships and collaborations are key to the success of the Peer Educators and the Virginia Family Nutrition Program.

Results

In 2018, a total of 94,351 limited income Virginians participated in programs offered by 84 Peer Educators located throughout Virginia and employed by the Virginia Cooperative Extension?s Virginia Family Nutrition Program. Another 35,000 were reached through social media. Based on pre- and post-tests, participants reported significant improvements in intake of whole grains, fruits, vegetables, dairy, and saturated fats and added sugars, as well as modest increases in physical activity. The Virginia Family Nutrition Program has been shown to be successful at promoting food resource management, healthy eating and physical activity among limited income adults to address and prevent obesity

4. Associated Knowledge Areas

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

Outcome #10

1. Outcome Measures

Preventing Opioid and Other Substance Misuse Among Youth in Rural Virginia

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia families and communities are grappling with the impact of opioid and other substance misuse on newborns, children, adults, seniors, schools, health and social service systems, the

workforce, and communities as a whole. On November 21, 2016, the Virginia State Health Commissioner declared the opioid addiction crisis a public health emergency. This issue is impacting rural, urban and suburban communities across the Commonwealth. Youth themselves are not immune to the epidemic, as 13% of high school students in Virginia report having misused a prescription medication. The overall mortality rate for prescription opioid overdose in Virginia in 2017 was 7.2 per 100,000 in rural counties and 5.3 per 100,000 in urban counties; mortality rate for fentanyl and/or heroin overdose was 4.3 per 100,000 in rural counties and 10.4 per 100,000 in urban counties. Solutions, including prevention, are needed at all levels. There are numerous prevention programs available that aim to reduce risky youth behavior, including substance misuse, or strengthen families. However, surveys show that most programs lack scientific evidence that they'll be effective. Some programs fail because of ineffective program design, poor implementation, lack of sustainability or shifts in focus. In the end, youth, their families and our entire society pay a great price for programs that do not work, and for ineffective delivery of programs that do work.

What has been done

PROSPER (PROmoting School-community-university Partnerships to Enhance Resilience) is the resulting evidence-based delivery system for supporting sustained, community-based implementation of scientifically-proven programs for youth and their families. The PROSPER Partnership Model, developed by Iowa State and Penn State Universities, links community teams with a university-based prevention science community using two existing systems â?? Cooperative Extension and the public school system. The result is community teams working at the local level to implement these proven programs. The PROSPER Partnership Model centers on community capacity building and sustainability so that programs will last over time and, ultimately, support the translation of prevention science into practice. VCE state and field faculty identified this model as a promising approach. Federal funding was secured to pilot PROSPER in two Virginia communities, namely Grayson County and Henry/Martinsville. After initial planning and coordination, PROSPER was launched and is ongoing in those counties.

Results

Results from the implementation of PROSPER and the related evidence-based curriculum in national, randomized studies show positive effects on family strengthening, parenting, youth skill outcomes and longer-term adolescent behavioral outcomes. Youth that participated in programs implemented through the PROSPER delivery system scored significantly lower on a number of negative behavioral outcomes, including drunkenness, cigarette use, marijuana use, meth use, and use of other illicit substances, up to 6Â½ years past baseline. Local PROSPER community teams have been formed in Henry/Martinsville and Grayson counties. VCE personnel and partners have been trained and begun implementation of the family-based Strengthening Families 10-14 program for 6th graders and their families. Moreover, school personnel and VCE faculty and staff have been trained and begun teaching the Botvin LifeSkills Training program in all 7th grade classrooms at the middle school level (560 total) in Laurel Park and Fieldale Middle Schools. Eight instructors were certified to teach the course, which is currently being taught as part of the 7th grade health/PE class by the teachers. Pre and post tests are being administered to assess changes in anti-drug knowledge, anti-drug attitudes, drug-refusal skills, and other critical life-skills such as assertiveness, relaxation, self-control. Botvin LifeSkills Training is designed to use developmentally appropriate and collaborative learning strategies taught through lecture, discussion, coaching, and practice to enhance studentsâ?? self-esteem, self-confidence, ability to make decisions, and ability to resist peer and media pressure . Anticipated results from the implementation of the PROSPER model in Henry/Martinsville and Grayson County include: Improved youth life skills (e.g., significant improvements in relationships with parents and peer resistance skills); Enhanced parenting skills; Increased family cohesion and well-being; Reduced exposures to substance use; Reduced gateway and illicit substance initiation; Long-term

reductions in substance use e.g., 40% reduced likelihood of having been drunk by 10th grade; Reduced youth behavior problems e.g., 40% fewer aggressive and destructive behaviors by 10th grade; Long-term effects on school engagement and academic success (e.g., higher GPA); and Reduced lifetime STD rates and substance use in young adults.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #11

1. Outcome Measures

?Look at What I Saved on My Grocery Bill!? An Incentive to Introduce Limited Resource Families to Home Gardening in Virginia

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Home grown food has promising potential to address national food security issues. In 2018, 310,563 Virginia households could not provide adequate food for their family due to lack of resources, such as low income. Historically, low-input home gardens provided nutritious food for US families. In 1943, the US boasted 20 million ?Victory Gardens? yielding 40% of the US produce consumption. There is a need to provide targeted training to limited resource (food-insecure and/or low-income households) in low-input gardening techniques in Virginia.

What has been done

In 2018, the VSU Horticulture program conducted ten home gardening trainings within at-risk, low-income communities. The trainings focused on increasing awareness, knowledge, and skills in low-cost, low-input gardening methods that are chemical free and pesticide free. Participant awareness of crop selection for nutrient dense cultivars and the importance of incorporating more produce into a healthy diet was emphasized. Participants learned about saving on their grocery bill by growing their own pesticide-free and chemical-free produce.

Results

As a result of the conduct of low-input gardening trainings, 100 limited resource individuals received hands-on education on how to plant and manage a home garden to feed their family and save on their grocery bill. A minimum of 50 limited resource participants planted a home garden yielding a minimum of 225 lbs. of pesticide-free and chemical-free local fresh produce in 2018 (11,250 lbs.), valued at $2.99 per pound (11,250 x $2.99 per pound). Limited resource participants saved a minimum total of $33,637 on their annual grocery bill, or $672.75 saved per individual household.

4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

Agrication in the Agrihood: Teaching Inner-City Neighborhoods to Grow, Eat, and Distribute Fresh Produce to Alleviate Hunger in the Inner City

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A Nigerian quote says ?The work of Nigeria is not complete for as long as there is any one Nigerian who goes to bed on an empty stomach.? This can be revised for our state: ?The work of Virginia is not complete for as long as there is any one Virginian who goes to bed on an empty stomach.? In 2018, 893,720 Virginians went to bed hungry and had no idea where their next meal was going to come from. In the US, one in four African American children goes to bed hungry which is double the incidence than white or Hispanic children (National Center for Children in Poverty, 2018). The introduction of urban agriculture into low income, predominantly African American inner-city communities has the potential to be a viable solution to hunger issues. Urban agriculture is the art, science, and practice of growing, processing, and distributing food within a geographical center wherein 50,000+ residents (area) or 2,500 to less than 50,000 residents (cluster) inhabit (US Census, 2018). Introducing the concepts of growing and distributing food

within urban areas or clusters requires an understanding of the needs and resources of a unique community and the ability to motivate and train individuals in the community to grow, process, and distribute foods for the enrichment of their neighborhood. If agricultural education (agrication) is successful, an inner city neighborhood may become an ?agrihood,? where residents grow, eat, and sell local foods.

What has been done

In response to educational requests for conducting trainings in urban agriculture, 26 urban ?agrication? trainings were conducted throughout Virginia teaching 879 individuals how to grow, process (prepare/cook), and/or distribute (share/sell) foods grown from community based gardens. Three (3) urban gardens (high tunnel, field, raised beds) were established in predominantly African American communities within Virginia.

Results

As a result of conducting 26 urban ?agrication? trainings, 250 participants received hands-on training on starting an urban garden enterprise, with 50 participants making the life decision to start an urban farm. Most importantly, three (3) low-income, urban communities established a demonstration garden to teach and feed their agrihood. The combined value of fresh produce grown and distributed from the three (3) community gardens is conservatively estimated at 14,118 pounds (high tunnel-1,080 pounds; field-12,500 pounds; raised beds-538 pounds) of pesticide free, chemical free (grown using non-certified organic methods) valued at $42,212.82 (14,118 pounds x $2.99 per pound). Sixty-five (65) low-income families receiving harvested pesticide free, chemical free produce and learned to prepare and cook produce for healthy meals. Each participating low-income family potentially saved an average of $649.42 on their grocery bill which could be applied to other needs, such as establishing an emergency savings account.

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

Antimicrobial starch nanocomposite films incorporating grape pomace extract and cellulose nanocrystals

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Food safety is a principal concern of the food industry. Microbial growth on the surface of foods is an important issue because this is the primary source of contamination and spoilage for many refrigerated food products. Antimicrobial agents incorporated into food packaging films may potentially control the growth of pathogenic and spoilage microorganisms. The utilization of grape pomace extract as a naturally occurring antimicrobial agent in combination with biodegradable nanocrystals derived from crop by-products or agricultural wastes is particularly desirable because it addresses the national needs for improved food safety and reduction of environmental pollution through the development of novel antimicrobial environmentally-friendly nano-composite food packaging materials. Furthermore, this research contributes to state and regional needs for agricultural economic development and increased income for rural farms and food industries by fostering value-added utilization of major agricultural commodities and their by-products (corn starch, stover and grape pomace).

What has been done

urrently, we succssfully completed the project. First, we extracted phenolic compounds from pomaces of four Virginia-grown grapes and evaluated chemical properties, including total phenolic compounds, tannins, total flavonoid, anthocyanin, antioxidant activity (DPPH and ABTS), and individual phenolic compounds, and antibacterial activity of extracts. Pomace extracts exhibited antibacterial activity against Gram-positive bacteria including Listeria monocytogenes ATCC 7644 and Staphylococcus aureus ATCC 29213, but not against Gram-negative Escherichia coli O157:H7 ATCC 3510 and Salmonella typhimurium ATCC 14028.

Further, we prepared starch-based antimicrobial nanocomposite films using the solution casting and evaporation process, and characterized their mechanical properties, color, water vapor transmission rate (WVTR), crystalline structure, morphology, thermal stability, phenolic compound release profile and antibacterial activity. Incorporating cellulose nanoscrystal (CNC) and grape pomace extract (GPE) significantly ($P<0.05$) increased the films? thickness, mechanical properties, and opacity. Brightness and color were mainly influenced by GPE level, while CNC had a great impact on the reduction of WVTR values of the film.

This research is to develop starch-based antimicrobial nanocomposite films which incorporate phenolic compounds (antimicrobial agent) from grape pomace and biodegradable nanofillers (cellulose nanocrystals) from agricultural wastes to address issues of food safety, environmental impact, and agricultural sustainability.

Finally, we applied starch antimicrobial nanocomposite films to ready-to-eat (RTE) chickpea meats and evaluated their effectiveness on microbial and physicochemical properties were evaluation at different times during refrigerated storage. The films incorporating GPE exhibited a stronger inhibitory effect on S. aureus ATCC 29213 compared to L. monocytogenes ATCC 7644. Further application of the films on RTE chicken meats indicated that during the 10 days storage period at 4 °C, the most effective against L. monocytogenes inoculated on the meat samples is starch nancomposite with white pomace extract.

Results

1) We are increasing our capacity to conduct research and student training in the characterization of the thermal properties of food packaging materials. 2) Four papers have been published in high impact peer-reviewed journals. 3) Seven presentations was made at professional meetings including the 18th Research Symposium of the Association of 1890 Research Directors. 4) Three graduate students completed their Master?s thesis research through this project graduating in May 2015, 2016, and 2017, respectively. 5) Three undergraduate students obtained hands-on training and research experience. 6) We are expanding industry collaboration and are working with Pfizer Healthcare Inc. on taste-masking film. 7) One student secured a summer internship with Pfizer in 2018 based on training obtained through this project. The effectiveness of grape pomace as a natural antimocribial is limited to certain Gram-negative food pathogens. More research is needed to identify other natural ingredients that function synergistically with grape pomace.

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
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: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	38.8	2.0	61.7	1.0
Actual Paid	42.1	2.5	55.3	3.0
Actual Volunteer	6513.0	200.0	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**
818999	83004	712837	421908
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1575089	66079	1708182	523177
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
3278765	0	9326275	0

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

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1455960	18111380	99114	245

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

Patent Applications Submitted

Year: 2018

Actual: 2

Patents listed
Granulated poultry litter ash (GPLA); Innovative methods to reduce ammonia volatilization from fertilizer.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	26	66	92

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational programs offered.

Year	Actual
2018	461

Output #2

Output Measure

- Number of educational materials and curriculas developed

Year	Actual
2018	161

Output #3

Output Measure

- Identifiable impacts reported by agents/specialists

Year	Actual
2018	22

Output #4

Output Measure

- Number of counties where drinking water clinics are held.

Year	Actual
2018	66

Output #5

Output Measure

- Number of participants in drinking water clinics.

Year	Actual
2018	5470

Output #6

Output Measure

- Number of drinking water samples tested.

Year	Actual
2018	2161

Output #7

Output Measure

- Number of extension agents, volunteers and agency collaborators trained through the Virginia Master Well Owner Network.
  Not reporting on this Output for this Annual Report

Output #8

Output Measure

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

Year	Actual
2018	19

Output #9

Output Measure

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

Year	Actual
2018	25

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.

Year	Actual
2018	42

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	Meeting water quality goals for agriculture under climate change
13	Tasty ?Bug Cuisine? Introduces Culture, Cooking and Environmental Awareness to Virginia?s At-Risk Youth
14	Potential use of purslane to clean up environmental chromium-6 contamination

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Nearly one quarter (21%) of Virginia's population (1.6 million people) rely on private water supply systems, such as wells, springs and cisterns, for their household water. In the US, municipal water supplies are regulated under the Safe Drinking Water Act by the Environmental Protection Agency, which mandates regular testing and water treatment. Homeowners who use private water supplies are completely responsible for routine testing, system maintenance and addressing any water quality problems, should they exist. Lack of knowledge about private water supply management and water quality issues may lead to system neglect and a lack of regular water testing, which can have serious implications for water quality, longevity of the water supply system, and, ultimately, the health and safety of the families who rely on these systems.

What has been done
The Virginia Household Water Quality Program (VAHWQP) provides confidential water testing and educates private water supply users through county-based drinking water clinics. With Virginia Cooperative Extension agents, trained through the Virginia Well Owner Network (VWON), faculty in Biological Systems Engineering (BSE) coordinate clinics in 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-six (66) drinking water clinics were held serving participants from 93 counties in 2018. This year, 2161 samples from private water supplies were tested. The sampled systems provide water for 5,470 Virginians. Statewide, in 2018, about 43% of all samples did not meet the EPA standard for public systems for total coliform bacteria, 9% were positive for E. coli, and 9% 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=14%), 65% of respondents reported attending the VAHWQP clinic interpretation meeting; 96% stated they believed they understood their test results. The most commonly reported recommended action taken after clinic participation was shock chlorination (23.3%), followed by installing or improving the function of water a treatment device (19.1%), performing maintenance on well (9.3%), and pursuing additional testing (8.8%). One-fifth of survey respondents shared more detailed actions they took. Nearly 75% of clinic participants report having never tested their water previously (41%) or testing it only once before (33%). Participation in a VAHWQP clinic is designed to encourage subsequent, annual testing using a commercial lab. If delivered commercially, the value attributed to the VAHWQP drinking water clinics offered in 2018 would be $691,520. The cost to the 2018 participants was $113,452, a cost savings of approximately 84%. In 2018, about 9,000 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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Forestry is the third largest industry in Virginia contributing over $23 billion a year to the economy. Forests also provide clean water and air, plant and wildlife habitat, scenery and recreational opportunities, and soil protection and enhancement. The annual value of these environmental benefits is estimated to be $21.8 billion. While 30% of Virginia's farm acreage is in woodland (NASS, 2012), few of farm based woodlands are managed. ANR Agents have a strong back-ground in Agriculture and are in trusted relationships with producers to suggest and encourage integration of woodland management into the whole farm operation.

What has been done

The Northern District NR Agent and Fauquier ANR Agent devised a plan to offer a Forestry In-Service to Northern District Agents, and later decided it worth a try at offering it statewide in August of 2018. After reaching out to the Central District ANR Agent (since a central location would be best), the team of three began what would later become the first â??NR Training for ANR Agentsâ?? held August 13-14, 2018 at Sweetbriar college in Amherst. The Central District NR Agent would be in charge of facilities usage and the sawmill grading preparations and exercise for day 1. The Northern District NR Agent would be in charge of sponsorship, field trip on day 2 and lodging communication. Major objectives would be for Agent participants to increase their understanding/knowledge:
How timberland is valued and can be estimated; Basic forest management principle;Agent participants will agree that forestland can be a valuable asset and should be integrated into a whole farm operation. (attitude shift)
Short-term: ANR participants will integrate one or more forest valuation &/or management related topics into their programs with agricultural producers. (behavior change); Long-term: As a result of increased integration of NR into existing ANR programs led by local Ag Agents, farmers will add forest management into their whole farm operation. This will increase financial resiliency through portfolio diversity as well as increase farm profitability.

Results

The Northern District NR Agent and Fauquier ANR Agent devised a plan to offer a Forestry In-Service to Northern District Agents, and later decided it worth a try at offering it statewide in August of 2018. After reaching out to the Central District ANR Agent (since a central location would be best), the team of three began what would later become the first â??NR Training for ANR Agentsâ?? held August 13-14, 2018 at Sweetbriar college in Amherst. The Central District NR Agent would be in charge of facilities usage and the sawmill grading preparations and exercise for day 1. The Northern District NR Agent would be in charge of sponsorship, field trip on day 2 and lodging communication. Major objectives would be for Agent participants to increase their understanding/knowledge:
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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.

Not Reporting on this Outcome Measure

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.

Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

irginia is home to many poultry, dairy, and swine operations and most of these operations must comply with DEQ animal waste programs under Virginia Pollution Abatement permit regulations. Permitted and non-permitted livestock operations should learn and practice up-to-date, efficient practices for proper storage and disposal of large amounts of waste, and furthermore, permitted operations are required to attend continuing-education training which provides imperative information and new research about nutrient management. However, training opportunities to meet this requirement are relatively rare and often require long-distance travel.

What has been done

In 2014, Amelia Extension collaborated with the Department of Environmental Quality when it became obvious that a DEQ-VCE partnership would be an ideal way to create a training opportunity to meet the educational requirements of permitted farmers in the region. This partnership resulted in the creation of an annual fall nutrient management program targeted for VPA permit holders. The DEQ-VCE partnership fostered a unique experience wherein participants receive both regulatory information and innovative research updates from Extension specialists; this has become the only program of its kind in this region. The 2018 program was held on November 28th at the VT Southern Piedmont AREC in Blackstone

Results

80 people attended the 2018 meeting. Impact was measured via a paper evaluation. 24 people returned the evaluation. Of these, 7 reported attending all five meetings held since 2014, and those who reported attendance in prior years were asked to describe the impacts of past meetings on their management choices. Two respondents said they are currently improving or have improved their recordkeeping. One person constructed more litter sheds so that all litter remains covered at all times. Attendees were also asked to indicate planned changes on their operations or in their work as a result of attending; one indicated plans to keep promoting clean water; one plans more frequent manure sampling; one plans to improve soil sampling; one plans improvements to records; two indicate planned changes to pack barn management; three indicated planned changes to water reporting; one may cement their litter shed floors in the future. Finally, of particular importance, approximately 50 farms satisfied their VPA permitting education requirement through this program, and the 24 people alone who returned the survey represent 9,623 acres of land managed under the influence of the nutrient management ?best practice? and regulatory compliance influence of this program.

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
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Virginia Department of Conservation and Recreation (DCR) works to manage both urban and agricultural nutrients found in fertilizers, manure, biosolids, and other sources. Management of these nutrients help in retaining their efficient use while ensuring they don?t impair the quality of Virginia?s ground and surface waters due to overuse in the field. The DCR reports nutrient management efforts to the U.S. Environmental Protection Agency, which monitors pollution runoff into the Chesapeake Bay. The DCR has stated it was nearing the maximum amount of agricultural and municipal-owned (airports, ball fields, parks, etc.) acreage under a nutrient management plan and was not on track to reach management goals for 2025 as set by the U.S. EPA. Excess runoff was occurring in Virginia?s urban areas and the DCR approached Extension to assist with nutrient management goals on residential landscapes.

What has been done
Unlike agricultural and municipal-owned acreages, homeowners are not regulated under Virginia law concerning nutrient management on their property. In conjunction with the concerns of Hampton residents about their lawn care needs, the ?Fescue Squad? was developed under the Healthy Virginia Lawns program through Virginia Cooperative Extension?s Urban Nutrient Management program team. The focus of this program is to decrease inputs of nutrients into the local surface waters and the Chesapeake Bay. It works to educate homeowners on the best management practices for fertilizing and caring for their lawn with an in-depth home visit.

Results
During our inaugural year (2017), three residents, accounting for 18,134 ft2 (0.42 acres) participated in the ?Fescue Squad? home visit program with 18,134 ft2 of turf under a nutrient management plan. Another 139 people were contacted through presentations and booth demonstrations around the City of Hampton. In 2018, participation in the home visit program

increased to nine residents, or three times the number of residents from the previous year. The amount of square footage under a nutrient management plan increased to 77,324.75 ft2, or 1.76 acres. Evaluation of the program remains ongoing, but many participants, including Hampton?s Assistant City Manager and Extension liaison to the city, Steve Bonds, have expressed appreciation for the program and state they are more knowledgeable about fertilizing and maintaining their landscapes. One person with initial feedback stated, ?Your suggestion of using a more drought tolerant grass and letting our grass go dormant has saved us on our water bill. My husband and I were thinking we had to maintain a green lawn all year round, but your advice of letting it go dormant [cutting back on fertilizer and water use] helped. We?re saving $75 a month on our water bill.?

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Efficient composting of organic wastes in lieu of the commonly employed processing, handling, and use/disposal methods will reduce detrimental effects on soil, water, and air . Furthermore, substitution of stabilized compost for uncomposted manures and biosolids, synthetic fertilizers and other materials can reduce soil, water and air degradation.

What has been done

A series of workshops, field days, webinars, and a compost school were conducted to provide the knowledge necessary for compost operators to lean and adopt proper composting technique, how to assess compost quality, and potential uses of the product.

Results

Results include: Municipalities and private industries have learned about the economic and environmental benefits of composting wastes.; Composting operators have learned proper techniques for processing wastes, assessing the quality of the finished product, and application uses for compost. 25 composting professionals received continuing education credits via our composting and compost use webinar series that will enable them to continue to meet regulatory requirements and best management practices; Agricultural and urban nutrient management planners and compost applicators have learned proper methods for assessing compost quality and sound application practices; Composting educators (Virginia Cooperative extension agents and master gardeners) have learned proper techniques for composting and sound application practices for improving soil and water quality; and Increased adoption of composting as a waste treatment tool has occurred. The mass of onsite municipal solid waste being composted and mulch increased from 382,987 tons during 2016 to >400,000 tons during 2017.

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to the Occupational Outlook Handbook, through the Bureau of Labor Statistics, employment of veterinarians is projected to grow 19 percent from 2016 to 2026 as consumers? pet-related expenditures continue to increase. This growth is much faster than the average for all occupations, yet admission into veterinary degree programs is still very competitive. Virginia Tech has the second largest applicant pool of all North American veterinary schools. The projected acceptance rate for the class of 2020 is 127 accepted students of 1437 applicants, and the requirements for admission remain stringent; students need a high GPA, a competitive GRE score, and significant volunteer experience working with animals in the veterinary field. The most recent situation analysis efforts for Montgomery County Extension indicates a need for programs that focus on career awareness and readiness. In addition, the goals for the 4-H Positive Youth Development Program Team indicate a need for educational programming in STEM and career readiness as described in their action plans. The 4-H Veterinary Science Workshop Series is needed to help educate youth about the various fields of study in veterinary medicine and to prepare students for future admission into degree programs.

What has been done

Montgomery County 4-H worked with local Veterinarian, Dr. Keath Marx, to provide a Veterinary Workshop Series for local youth, ages 9 to 18. We provided the workshop series every Monday night for eight weeks at the Virginia Tech Veterinary School. Instructors for the classes included Professors from the veterinary school, local veterinarians, and other veterinary professionals. Class topics included small animal practice, toxicology, parasitology, exotic animal and wildlife care, large animal care, food safety and aquaculture, and radiology and ultrasound. The goals of the program were to introduce youth to different areas and fields of study in veterinary medicine and to prepare them for what would be required for admission into the veterinary school.

Results

Following the 4-H Veterinary Science workshop series, we requested that parents complete a Qualtrics survey assessing their perceptions of the program and of their child's experience with the program. Ten parents completed the survey. Of these, nine (90%) agreed or strongly agreed that the workshops were informative for their child and that their child learned more about career opportunities in veterinary science. Eight (80%) indicated that their child or children enjoyed the program and found the information interesting. Nine (90%) agreed or strongly agreed that the series helped to spark an interest for their child in someday becoming a veterinarian. Some of the comments about the workshop series included: ?This program was so incredible, my granddaughter enjoyed and learned so much from the veterinary science workshop series. I am so grateful that she was able to participate in such an outstanding program. I would love to find more opportunities like this in the future.?; ?My daughter, husband, and I really enjoyed every one of the sessions. I think its important that the kids got to see the fun and rewarding parts of this profession, as well as the boring, frustrating, and sometimes sad aspects of the job. I appreciate the "real life" factor! Also, I think the first lecture on what getting into vet school REALLY involves is so important; a lot of the younger kids may have been bored, but for those who are getting close to the age where they need to start planning high school courses, this kind of info is

invaluable.?; ?Thanks to everyone who helped put this series together.?; ?This is the second time my daughter has attended and the breadth of information has been very good each year. She's expressed an interest in being a vet tech or a vet, and I'm glad we have this resource for her to see what each of those careers can be like.?

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Americans? interest in nature is growing. There is a large constituency of people, both urban and rural, engaged in non-consumptive uses of natural resources such as birdwatching, and studies show this population is growing. Research also shows, however, that Americans still face a significant gap between their interest in nature and their ability and opportunities to pursue that interest. Individuals need opportunities to be actively involved in exploring, caring for, and observing nature in their local communities. Furthermore, because the most impactful experiences in nature are deeply social, opportunities to connect people with nature through social groups are needed. At the same time, the Commonwealth of Virginia is facing difficult natural resource challenges, such as loss of forestland, sea level rise, and invasive species impacts. State and local natural resource agencies need help to accomplish their missions, address these natural resource challenges, and reach more sectors of our population. Public engagement is critical to successful conservation and management of Virginia?s woods, wildlife, and waters.

What has been done

The Northern Neck Master Naturalist program addresses these needs by having volunteers provide education, outreach, and service dedicated to the beneficial management of natural resources and natural areas. The program aims to extend the capacities of both state and local natural resource agencies and organizations to be able achieve their missions in new ways, engage new audiences, and work towards creating a citizenry more informed about and involved in natural resource conservation and management. The program, because of its chapter-based structure, also promotes learning about, exploring, and stewarding natural areas through social groups. At the statewide level, the program is sponsored by seven state agencies, and on the local level, chapters partner with dozens of conservation and education organizations. The Northern Neck Master Naturalists partner with several sponsoring agencies and other organizations, including Belle Isle State Park, Rappahannock River Valley National Wildlife Refuge, Stratford Hall, Chesapeake Bay Foundation, and the Northern Neck Land Conservancy.

Results

In 2018, the Northern Neck Master Naturalists had 54 active volunteers, completing a total of 7785 hours of community service. 2979 hours of service were spent on projects with sponsoring agencies, 1999 hours were on education/outreach projects, and 1520 hours were with citizen science projects. Stewardship projects made up 695 hours. Because of the stewardship projects completed, more than 160 acres of habitat were improved, more than 115 miles of streams and trails were improved, and 40 sites were improved. Members spent 830 hours on continuing education, to make a greater impact in the Northern Neck community. Through education and outreach programs, members of the Northern Neck Master Naturalists made 575 educational contacts in 2018.

Meadows were the focus of a 2018 year-long series to learn about their importance and how to create and sustain meadows to provide food, shelter, and places to raise young for vital members of our ecosystem that depend on these early successional communities: pollinators, birds and other wildlife species. The chapter benefitted from the associated stewardship, citizen science, and environmental education activities tied to the year-long series. The learning series focused on meadows on the Northern Neck and how to add meadows within our counties, communities, and yards. The series was open to the public and was a key aspect of chapter outreach as well as environmental education. The 2018 Meadows Series was led by Certified Virginia Master Naturalists Bryna Brennan and Betsy Washington.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #12

1. Outcome Measures

Meeting water quality goals for agriculture under climate change

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Climate change may increase precipitation, temperatures, and pollution loading and necessitate additional measures and costs to achieve water quality goals. Chesapeake Bay Watershed is under a mandate to reduce nitrogen, phosphorus, and total suspended sediment loads by 25, 25, and 19%, respectively by 2025. Agriculture is a key player in achieving such reductions as it accounts for an estimated 42% of the nitrogen, 55% of the phosphorus, and 60% of the sediment entering the Chesapeake Bay. What are the costs to agriculture to achieve such reductions in pollution and how will these costs be affected by climate change?

What has been done
A team of Virginia Tech faculty researchers, led by agricultural economist Darrell Bosch, used two climate change models and the mean of the ensemble of seven climate models (Ensemble Mean), a yield prediction model (SWAT-VSA), and a farm economic model to estimate how climate change would affect crop yields and the costs of reducing nitrogen (N) loading by 25 percent in an agricultural sub-basin of the Chesapeake Bay. The researchers estimated costs of meeting water quality goals based on the reduction in farm net returns from limits on N loadings under historical and future climate scenarios.

Results
Estimated costs of meeting a nitrogen loading reduction goal depend on the desired amount of reduction and the probability of achieving the desired reduction. Costs of achieving water quality goals increase under future climate for one of the two climate models and for the Ensemble Mean of climate models. For example, based on the Ensemble Mean, a 25 percent nitrogen reduction achieved with 75 percent probability of success costs $10,937 under historical conditions and $15,817
under future climate, a 45 percent cost increase. Major reasons for increased costs are higher predicted N loading from crops and higher N loading reductions to be achieved under future climate. The farm meets N limits by eliminating wheat and reducing corn and soybean production as well as increased use of best management practices (BMPs) including Conservation Reserve Program (CRP). Researchers should analyze effects of climate change on the costs of meeting water quality goals using multiple climate change prediction models and considering possible crop substitutions as well as crop and livestock BMPs. Further research should consider how commodity market reactions to producers? choices under climate change affect costs of meeting water quality goals.

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
605	Natural Resource and Environmental Economics

Outcome #13

1. Outcome Measures

Tasty ?Bug Cuisine? Introduces Culture, Cooking and Environmental Awareness to Virginia?s At-Risk Youth

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The thought of eating bugs may be shocking to most Americans, but over two billion people worldwide eat insects as part of their typical daily diet. Globally, by the year 2050, the world?s population will hit nine billion people, and food security will be paramount. Americans will need to consider alternative protein sources to meet their nutritional needs in the future. University of Wisconsin-Madison researchers conducted clinical trials and found cricket consumption promotes beneficial gut bacteria. Recent studies discovered that 70% of the human immune system resides in the gut, and the gut bacteria directly assists in the development of T-cells in the immune system informing T-cell recognition and distinction between foreign invaders and the body?s own tissues in the line of attack against disease. The UWM clinical scientists found cricket consumption is not only safe, it may reduce body inflammation.

What has been done
In order to teach at-risk youth (ages 10-18) environmental awareness and nutritional skills, the VSU Natural Resources Program has developed the ?Bug Cuisine? curriculum and conducted ten trainings in Virginia with a focus on communities with minority, at-risk youth who may be interested in a future career path in environmental science.

Results

As a result of the development of ?Bug Cuisine? curriculum and the conduct of ?Bug Cuisine? trainings, 300 at-risk youth participants in Virginia gained knowledge about how eating bugs can improve food security, protect the environment; 300 at-risk youth participants gained skills in preparing and cooking bugs for a tasty snack, entrée, or dessert. 150 at-risk youth stated that they enjoyed cooking and eating bugs and planned to share ?Bug Cuisine? knowledge with their families and friends; 100 at-risk youth participants would consider a future career in environmental science.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #14

1. Outcome Measures

Potential use of purslane to clean up environmental chromium-6 contamination

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Chromium is a natural element that exists in several different forms. While chromium-3 is a nutrient essential for human health, hexavalent chromium, or chromium-6, is a carcinogen. Exposure to chromium-6, either through breathing or up-taking, can lead to various cancers such as lung cancer and stomach cancer. Chromium-6 is produced by industrial processes and used in wood preservation, electroplating, and textile manufacturing. The coal ash released by coal-burning power plants is also a major source of chromium-6, and more than 10 million pounds of the element are produced by electric utilities in the U.S. each year. If not treated properly, the chromium-6 that comes from all of these sources can run off and contaminate water systems that include drinking water system, and water for agricultural and aquaculture use. A recent report by the Environmental Working Group (EWG) found that the tap water of hundreds of millions of Americans contains chromium-6 at a considerably dangerous level. The removal of chromium-6 from contaminated sources before it runs into drinking water systems or the efficient treatment of chromium-6-contaminated water are essential to protecting human beings from exposure to chromium-6.

What has been done

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

Results

Purslane could be a natural way to clean soil contaminated with Chromium-6. Thus this study will not only benefit human health through providing clean living environments, but it will also contribute to safe urban agriculture through providing clean lands in urban areas.With further support from USDA-CBG program, we are currently investigating the identified Purslane accessions for their potentials to remediate contaminated chromium from coal ashes generated by Virginia Dominion Power. Additionally, we also plan to dissect the molecular mechanisms that control the uptakes of heavy metals, through genomics approach.

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
403	Waste Disposal, Recycling, and Reuse

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: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	44.2	3.0	0.0	0.0
Actual Paid	48.2	1.0	0.0	0.0
Actual Volunteer	1360.0	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**
355747	169718	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
684168	132157	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1424189	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

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	19699	69532	13068	224

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

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of child care providers attending trainings.

Year	Actual
2018	254

Output #2

Output Measure

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

Year	Actual
2018	417

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.

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Every 83 minutes a child under the age of 5 in Virginia is abused or neglected (www.childwelfare.gov/topics/preventing). The James City County Needs Assessment (2016) states that early and persistent aggressive and anti-social behavior in youth, unchecked by age 6, is a key risk factor for future violence, and aggressive behavior in young children. The needs assessment also indicates the need for quality early childhood programs that promote the social competence, health and well-being of children and include quality family support and parent education systems.

What has been done
The Virginia Cooperative Extension Family Focus Program in James City County conducts parent/child interactive playgroups. Playgroup combines parenting education with early childhood education while promoting all 6 Common Protective Factors. Activities are conducted that are developmentally appropriate for children and promote social competence and school readiness. Parent educators conduct discussions on relevant parenting topics such as positive discipline, identifying parenting strengths, developing positive social skills in children, and lasting social connections. Families have a myriad of opportunities to learn and practice positive, nurturing parenting skills under the guidance of trained and experienced parenting educators</Expr1><Expr1>, Results: One hundred and ninety-two families in James City and York Counties participated in playgroups with the Family Focus program in 2017. Three hundred and forty-two young children between the age of 1 and 5 years old in both James City and York Counties had the opportunity to participate in the playgroups conducted in 2017. Parents of participating children completed an evaluation on the positive development of their children after attending playgroups with the Family Focus program. Eighty-seven parents and grandparents, all of which participated in at least six playgroups, reported that they have increased their skills in identifying personal and parenting strengths. They also reported knowledge gain in the area of

child development and increased skill in providing their children with developmentally appropriate opportunities to learn. Sixty-seven percent of children that participated in playgroups decreased their use of aggressive behavior after six sessions. Thirty-three percent show increased behavior change in the ability to calm their aggressive behavior after little to no prompts from their parent(s). One hundred percentage of child participants demonstrated positive social skills amongst their peers, and an increased ability to resolve problems in peaceful ways by practicing brainstorming skills.

Results

One hundred and eighty-three families in James City and York Counties participated in playgroups with the Family Focus program in 2018. Two hundred and ninety-seven young children between the age of 1 and 5 years old in both James City and York Counties had the opportunity to participate in the playgroups conducted in 2018. Parents of participating children completed an evaluation on the positive development of their children after attending playgroups with the Family Focus program. Out of the 66 parents and grandparents that participated in our survey, all of which participated in at least six playgroups, 57 reported that they have increased their skills in identifying personal and parenting strengths. They also reported knowledge gain in the area of child development and increased skill in providing their children with developmentally appropriate opportunities to learn. Ninety-five percent of children that participated in playgroups decreased their use of aggressive behavior after six sessions. Sixty-seven percent showed increased behavior change in the ability to calm their aggressive behavior after little to no prompts from their parent(s). One hundred percentage of child participants demonstrated positive social skills among their peers, and an increased ability to resolve problems in peaceful ways by practicing brainstorming skills.

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

While the median household income in Virginia ($66,916) is higher than the median U.S household income ($56,277) (Census.gov), Virginians also take on more debt than the typical U.S. household. For example, Virginia is among the top ten for highest levels of debt. At the national level, the 2018 Consumer Financial Literacy Survey prepared by Harris Poll found that 79% of adults would benefit from advice and answers to everyday financial questions and 73% are currently worried about their personal finances. This same survey revealed that 24% reported finding it difficult to reduce debt due to unexpected financial emergencies. 8% of all adults have debts in collection with Millenials (18-34) having a greater percentage in collection (13%).

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.

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. VCE 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. To aid in training, Dr. Mountain disbursed $2,400 out of the Celia Ray Hayhoe endowment to be used to be used by VCE agents to support their training. Additionally Dr. Mountain provided one AFC scholarship out of personal program funds totaling $1250 to help support VCE agent training.

Results

The pool of Master Financial Education Volunteers (MFEV) has steadily grown over the past few years. In 2018 11 VCE agents were involved in training 146 volunteers (130 of whom have graduated from the program) in 11 different cohorts. The 130 graduates compared to 115 graduates in 2017, 188 graduates in 2016, and 100 graduates in 2015. In 2018, 324 Master Financial Education volunteers contributed 8191 hours (up from 205 MFEV and 4311 hours in 2016 but down from 353 MFEV and 9912 hours in 2017) equating to $245,402 ($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

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The 2018 Junior Achievement/The Allstate Foundation reported that 72% of teens look to their parents for money management information. The report also shows that 50% of youth have a goal of creating a savings plan while 43% are concerned that they do not have the skills to manage their money. Meanwhile, America Saves (2015) state that while youth are aware that it is important to save, they donâ??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 37 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 7 states that require personal finance student testing (councilforeconed.org) as of 2018. 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.
A 2016 Bank of America/USA TODAY Better Money Habits Report found that young Americans 18 to 26 years of defined adulthood as financial independence. This population indicated they wished they had learned more about personal finance in school. Only 31% reported their high school did a good job teaching financial skills and only 41% of those attending college reported that their college did a good job.

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

12 agents conducted a total of 54 Kids Marketplace simulations in 2018 with an audience of 2353 children. Of those surveyed, 88% of these youth learned more about using money,85% learned that different jobs pay different amounts of money, 92% reported that the program gave them new ideas on how to handle money in the future, and only 12% of youth did not plan on talking with their parents about money and the program. 72 Agents conducted a total of 137 Reality Store programs in 2018 with an audience of 9,924 children. Of those surveyed, 94% stated the program increased awareness of making smart financial decisions and 98% reported that having insurance and a savings account would help plan for emergencies, and 92% reported there is a clear relationship between my performance in school, my participation in community activities, and my future occupation. 13 Agents conducted 46 Real Money, Real World programs in 2018 with an audience of 2678 children. Of those surveyed, 79% indicated they will think through how spending impacts other opportunities and choices and 71% stated this program helped them decide they will seek out more training or education after high school. Combined, 14,955 Virginia youth were reached by Extension Financial education in 2018, an increase from 10,573 in 2015, 9046 in 2014, and 7681 in 2013 but a decrease from 15,787 youth in 2016 and 13,497 in 2017. I believe part of this year over year decrease observed the past two years is due to fewer agents providing data. 1,907 volunteers contributed 9,964.5 hours equating to $298,536.42 ($29.96/hour) in 2018. This compares to 1,734 volunteers and 7,519 hours in 2017, 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

Outcome #4

1. Outcome Measures

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

Not Reporting on this Outcome Measure

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Every 83 minutes a child under the age of 5 in Virginia is abused or neglected (www.childwelfare.gov/topics/preventing). The James City County Needs Assessment (2016) states that early and persistent aggressive and anti-social behavior in youth, unchecked by age 6, is a key risk factor for future violence, and aggressive behavior in young children. The needs assessment also indicates the need for quality early childhood programs that promote the social competence, health and well-being of children and include quality family support and parent education systems.

What has been done
The Virginia Cooperative Extension Family Focus Program in James City County conducts parent/child interactive playgroups. Playgroup combines parenting education with early childhood education while promoting all 6 Common Protective Factors. Activities are conducted that are developmentally appropriate for children and promote social competence and school readiness. Parent educators conduct discussions on relevant parenting topics such as positive discipline, identifying parenting strengths, developing positive social skills in children, and lasting social connections. Families have a myriad of opportunities to learn and practice positive, nurturing parenting skills under the guidance of trained and experienced parenting educators.

Results
One hundred and eighty-three families in James City and York Counties participated in playgroups with the Family Focus program in 2018. Two hundred and ninety-seven young children between the age of 1 and 5 years old in both James City and York Counties had the opportunity to participate in the playgroups conducted in 2018. Parents of participating children completed an evaluation on the positive development of their children after attending playgroups with the Family Focus program. Out of the 66 parents and grandparents that participated in our survey, all of which participated in at least six playgroups, 57 reported that they have increased their skills in identifying personal and parenting strengths. They also reported knowledge gain in the area of child development and increased skill in providing their children with developmentally appropriate opportunities to learn. Ninety-five percent of children that participated in playgroups decreased their use of aggressive behavior after six sessions. Sixty-seven percent showed increased behavior change in the ability to calm their aggressive behavior after little to no prompts

from their parent(s). One hundred percentage of child participants demonstrated positive social skills among their peers, and an increased ability to resolve problems in peaceful ways by practicing brainstorming skills.

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

While the median household income in Virginia ($66,916) is higher than the median U.S household income ($56,277) (Census.gov), Virginians also take on more debt than the typical U.S. household. For example, Virginia is among the top ten for highest levels of debt. At the national level, the 2018 Consumer Financial Literacy Survey prepared by Harris Poll found that 79% of adults would benefit from advice and answers to everyday financial questions and 73% are currently worried about their personal finances. This same survey revealed that 24% reported finding it difficult to reduce debt due to unexpected financial emergencies. 8% of all adults have debts in collection with Millenials (18-34) having a greater percentage in collection (13%). The well-being of Virginians depends on individual and family financial capacity. Financial capacity will enable individuals to make informed choices, sound decisions, and avoid financial pitfalls, as well as obtain knowledge of strategies to implement during times of financial crisis. The process of developing financial capacities will provide individuals the appropriate tools to understand and apply financial products, services, and concepts in an effort to improve their financial situation.

What has been done

FCS Agents collaborated with Master Financial Education Volunteers, Extension Leadership Council members and community volunteers to deliver financial literacy workshops, and one-on-one counseling sessions to Virginia residents. FCS Agents collaborated with the Department of

Social Services, Department of Housing, community colleges, Volunteer Income Tax Assistance Sites, earned income tax sites, community organizations, correction facilities, as well as churches and businesses across the state.

Results

Results: 4040 adults attended one of 537 sessions led by 15 VCE Extension agents in 2018. There was a dramatic increase in planned behavior based on surveys taken prior to the adult financial literacy programs and after them: A 690% increase in those planning on writing short term financial goals. A 707% increase in those planning on writing a spending and savings plan. A 725% increase in those planning on paying themselves first for savings. A 470% increase in those planning on having an emergency fund. A 499% increase in those planning on paying down debts. A 443% 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 #7

1. Outcome Measures

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

Not Reporting on this Outcome Measure

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The economic climate in Patrick County faced a downturn in the fall of 2017 with the closure of our local hospital and local manufacturing plant losing approximately 350 jobs. These business closures follow a long list of job loss our community has faced over the past ten or more years. Faced with continual business closures, it is believed that our youth need to understand employment options and opportunities outside of working for an employer, for example being their own employer, if they choose to stay in our community to fulfill their career goals. Based on input from the local Chamber of Commerce and local business owners it was suggested that a youth entrepreneurship training be offered within the community.

What has been done

Extension and Patrick County 4-H was a part of a larger community group/partnership to educate and provide hands on learning experiences to local youth regarding youth entrepreneurship. Through a community wide three day training, called AirPC, Rise and Shine Market was formed. The AirPC training culminated with grant funding for community project proposals. Rise and Shine Market is a youth entrepreneur program, for youth ages 8 to 18, which aims to teach local youth entrepreneurial skills including: writing a business plan that encompasses developing an initial product idea, marketing, finances, product pricing, and profit. After completing their business plan youth are invited and encouraged to participate in a total of four Rise and Shine Markets at which they execute their business plan and sell their own products, either grown or made by the youth. Rise and Shine Markets were held at the local Farmers Market during the months of July, August, September, and December. Although funding was available thanks to the AirPC grant, minimal funds were required the first year of the Rise and Shine market due to immense community support and free use of the Farmers Market Facility.

Results

The market was an initial startup program with the dream that it would it lead to a sustainable yearly market. Thanks in part to the outpouring of community support from local community members, civic organizations such as the local Rotary organization, and parents and youth participants the market was a huge success. Over the course of the four Rise and Shine Markets held, 65 total booths were operated by the youth participants. A total of 40 local youth participated across the four markets held. Of those 40 participants, 28 were repeat vendors and hosted a booth at more than one market. Out of the repeat vendors, three youth attended and hosted a booth at every market held. After each market a reflection session was held with the youth participants. Youth were asked to reflect on their experience in general. More specific questions regarding what did and did not work for them, what they would do different at the next market, what challenges did they face, what skills did they believe they were missing, and most importantly did they enjoy running their own business(booth)! Participants were surveyed at the conclusion of each market as well. Out of the 40 participants, 85% believed they learned entrepreneurial skills that they could use in the future. Out of the 40 participants, 80% surveyed stated that they would like the Rise and Shine Market to be an annual event. Parents and guardians of the 40 participants all expressed that they would like Rise and Shine to be a sustainable project for their youth. Out of the parents and guardians, 95% felt that their youth participant had gained youth entrepreneurial skills from participation in the market. At the last market in December, 90% of the youth participants stated that they planned to participate in the Rise and Shine Market next year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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: 2018	Extension		Research	
	1862	1890	1862	1890
Plan	100.3	3.0	0.0	0.0
Actual Paid	90.3	2.0	0.0	0.0
Actual Volunteer	15367.0	368.0	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**
2052385	80454	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
2341958	65956	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
8216474	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

2018	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	132051	15500910	764177	904834

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

Patent Applications Submitted

Year:	2018
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2018	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2018	2107

Output #2

Output Measure

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

Year	Actual
2018	16

Output #3

Output Measure

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

Year	Actual
2018	217964

Output #4

Output Measure

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

Year	Actual
2018	126983

Output #5

Output Measure

- Number of youth engaged in Citizenship.

Year	Actual
2018	117392

Output #6

Output Measure

- Number of youth engaged in Healthy Lifestyles.

Year	Actual
2018	54484

Output #7

Output Measure

- Total number of adults volunteers.

Year	Actual
2018	0

Output #8

Output Measure

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

Year	Actual
2018	0

Output #9

Output Measure

- Total number of youth volunteers.

Year	Actual
2018	0

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	Cultivating Appreciation for Nature and Food Origins: Interactive Farm Tours for K-12 students and teachers at VSU Randolph Farm

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Positive youth development focuses on building skills that youth need to be successful, contributing members of society. The Community Network for Youth Development identifies development of independence skills as an important step in youth learning to be productive and connected, while learning to navigate the world. In an increasingly structured and supervised environment, youth need opportunities to practice independence skills including decision-making, problem solving, planning, and conflict resolution. Utilizing previously taught life skills is an important step in youth learning to be critical thinkers and while plotting their course through life. By incorporating Character Counts! education curriculum into the summer residential 4-H camp program, youth not only learn valuable life skills and how to practice them, but how to do so with the six pillars of character in mind.

What has been done
Life skills are taught and practiced every day at summer residential 4-H camp. Independence is fostered through attending short-term residential camping programs where youth do not have parents or guardians to make decisions or do their work for them. Youth attending 4-H Junior camp develop independence by practicing decision making through daily programming activities, choosing schedules, and making personal living choices. Problem-solving skills are enhanced through camp classes, living in a group environment, and participating in group activities. Communication skills are addressed as youth work with teen and adult volunteers to develop activities, prepare team challenges, and plan their day. Conflict resolution is developed on an as needed basis as campers learn how to live with, interact with, and communicate with new acquaintances, and old friends. Each day, beginning on the first full day of camp, two of the six pillars of Character Counts! education are incorporated into class curriculum, pack meetings, mealtime events, and evening programs. Campers, teen leaders, and adults are encouraged to model all six pillars each day, but emphasize and notice the two highlighted pillars on the corresponding day. The importance of Respect, Responsibility, Caring, Trustworthiness, Fairness,

and Citizenship are discussed and PRACTICED in a variety of ways with outstanding campers, teens, and adults recognized each evening for their accomplishments in each of those areas.

Results

Post camp surveys were distributed among a random selection of the 398 campers and volunteers of the Botetourt and Rockbridge Counties camping cluster. Campers stated their behaviors increased in making good decisions, being more responsible for my actions, learning new skills, and helping others. When asked what they enjoyed most about 4-H Camp they responded they liked "meeting new friends, having fun, being able to be myself while at camp, classes, and getting together during campfire and singing songs." On the average 90% of the camper population felt safe and indicated a high comfort level with being able, to talk openly with teen and adult leaders and 92% shared that they would definitely return to camp the following year. Campers shared the following: "This is THE BEST camp, EVER", "This camp is awesome. I love talking to the teens and learning from them!" For many campers, this week away from home is the only vacation they receive during the summer. 4-H Camp provides the opportunity to expand the world of many children, while teaching them life skills and important life lessons that will help keep them on a positive path to becoming productive, contributing citizens.

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Situation analysis conducted by Chesterfield Cooperative Extension in 2018 identified youth issues as a top-five priority issue, which is consistent to concerns expressed in the 2013 situation analysis for Chesterfield as well. Specifically, teen leadership, decision-making and life skills, youth violence, and teen volunteerism/civic engagement were highlighted. The 2018 Youth

& Family Indicators Report (Chesterfield Youth Planning Commission) presented a Risk and Protective Factor Model that showed youth are less likely to engage in risky behaviors if they 1) have a sense of ?right? & ?wrong?, 2) associate with peers engaging in pro-social behavior, 3) participate in positive school/community activities, 4) feel rewarded for working hard in school and the community.

What has been done

Response: In 2013 a 4-H Teen Club was created in Chesterfield County to extend camp counselor training to a year-round leadership program focused on life skills and building friendships in a safe environment. Since that time, this program has evolved to provide teens with numerous leadership opportunities at the local, district and state level as well as service to their community. The 4-H agent also collaborated with specialists and agents across the state to create a Teen Think Tank focused on enhancing the quality of teen programming across Virginia.

Results

In 2018 there were 52 Teen Club members who attended monthly meetings, service projects, and volunteered at 4-H camps, outreach events, awards, & contests. During 2018 the members of the Teen Club contributed 3,300 volunteer hours toward the 4-H camping program alone. Members contributed an additional 120 hours through service projects, day camps, and community events. Based on the current value of a volunteer?s time ($24.69/hour; 2018 Independent Sector data) the teens provided more than $84,400 of donated support critical to 4-H programming in Chesterfield. In 2018 Chesterfield teens also held multiple leadership positions within the State 4-H Cabinet. One teen completed her term as Cabinet mentor, another completed her role as Southeast District Ambassador, and a third teen was newly elected as District Ambassador for the 2018-19 term. Chesterfield Teen Club members were selected to the 2017-18 Teen Excellence Leadership Institute (n=2) and to attend 2018 Citizenship Washington Focus (n=4) through a grant sponsored by Altria. Under my leadership, these teens have represented 4-H interests at such events as 4-H Day at the Capitol and the Virginia Agribusiness Banquet. We have met with local and state representatives and even the Governor of Virginia. The 4-H Teen Club created three different digital media pieces for entry at the statewide Virginia Youth Voices (VYV) event. Two of these pieces were used for 4-H promotion at parent orientation for camp as well as on the Chesterfield extension website.

The Teen Think Tank team, led by specialist Dr. Tonya Price, distributed a statewide survey to currently active teens and their parents/guardians to gather insight on how they became involved in 4-H, what keeps them engaged in the program, what they have learned as a result of their participation, how they are utilizing what they have learned, and their familiarity with the variety of opportunities available to teen 4-H members. In late 2017, data from 233 teens and 388 adults was collected across all four districts with 71 of our 106 units in Virginia participating. The age range of teen respondents was 13-19 years old. Results from this study were used to determine trends for future teen 4-H programming and the completion of two peer-reviewed VCE publications for 2018 (Publication 4H-786, The Value of Teen Leadership and Publication 4H-785, The Value of Teen Leadership Quick Guide). Our workshop proposals for ?Teens as a Valuable Resource? and ?Connecting with Teen Audiences? were both accepted for delivery at the Joint Council of Extension Professionals (JCEP) conference and VCE in-service, respectively, both of which will be held in February 2019.</Expr1><Expr1>, Impact Story #1: Excerpts from a letter written by Paris Woods, former Chesterfield Teen Club member (current sophomore at James Madison University), dated October 10, 2018.

In this short letter, I wanted to take some time to tell you how much I appreciate you. Besides my mom, you have been the person that has watched me grow up! My first year as a teen counselor was with you, and I know we were both nervous! However, as I saw how confident you were and

how excited you were, my mind was instantly put to ease. You have been one of my greatest support systems and I could not be more grateful! You've inspired me to reach for new heights whether it be applying for Southeast District Ambassador, choosing to go to school where you did, or going to South Africa. You gave me my one and only award in my entire middle/high school experience. That moment meant the world to me and I wanted you to know that. Thank you for being the role model I hope to be for someone else one day!

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research shows that youth who serve as leaders learn and practice decision making, conflict management, responsibility, and other life skills. 4-H teens serve as leaders for other youth at unit, district, and state 4-H events. However, many of these teens lack the leadership skills necessary to lead others and may not provide a positive environment for youth development. In addition, the Franklin County 2018 Situation Analysis identified the need for youth to have opportunities for extra-curricular activities and educational programs that will help them develop job skills.

What has been done
The Franklin County Cooperative Extension office provided leadership training for teens 13 ? 19 years of age through officer training, camp counselor training, and other leadership projects to build leadership skills. As a result, 30 teens participated in 720 hours of leadership training.

Results

97% of teens reported positive attitude change in responsibility, decision making, conflict management, or problem solving. 100% of teens reported gaining knowledge of the importance of accepting differences of others. Additionally, 100% of teens indicated improvement in critical thinking and teamwork as a result of participation in leadership training. Furthermore 100% of parents and 4-H leaders observed an increased willingness of teens accepting leadership roles and improved leadership skills in parliamentary procedure, responsibility, and teamwork as a result of participation in the leadership training.

When teens were asked what the most important thing that they had learned through 4-H, some of the responses are listed here: ?I?ve learned to be a better person in 4-H;? ?Everything! All that I have learned will help me in all aspects of my life;? ?How to set a good example and how to be a leader; ? "Leadership skills;? ?I have learned how to effectively communicate and how to hold leadership positions; ? ?Positive thinking, team work, and how to be dependable;? ?Leadership and Initiative;? ?Holding leadership roles such as being a teen counselor has helped me in school, in sports, and on jobs that I have had."

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
2018	0

3c. Qualitative Outcome or Impact Statement

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

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Volunteers are essential to the success of Virginia Cooperative Extension (VCE) programming (Enfield, Schmitt-McQuitty, Smith, 2007). Volunteer support is important in fulfilling programmatic objectives for 4-H, such as ?providing care, guidance, respect, knowledge, and wisdom to youth participants? (Stedman and Rudd, 2006). Trained 4-H volunteers are needed to fill these roles and engage youth in civic and 4-H club activities which help youth develop the four essential elements identified as positive outcomes including mastery, generosity, independence and belonging. Culpeper 4-H depends on volunteers to lead clubs, camps, and events, thus increasing the reach of programming beyond what staff can provide alone.

What has been done

The 4-H Extension Agent supported new and experienced volunteers through group and individual training sessions and through collection of enrollment data. Support was given through formal and informal training sessions, committee meetings, attending club meetings, meeting individually with volunteers in person, by phone, or by email. Topics included communication,

club/project management, risk management, VCE policies and procedures, community service opportunities, conflict resolution and youth development basics. Volunteer opportunities ranged from one time occasional volunteers to organizational club volunteers who contribute large amounts of time throughout the year. Most volunteers work directly with enrolled 4-H youth though the unit 4-H program.

Results

In 2018, 424 volunteers supported 3,067 enrolled 4-H youth. Adult volunteers served as role models for youth and contributed to community well-being by offering positive youth opportunities. In Culpeper County, volunteer leaders contributed to the success of the 4-H youth development program by organizing and facilitating clubs, instructing summer workshops and other short term classes, chaperoning one-time events, overnight and day camps, hosting livestock clinics, planning the county fair, and judging contests. The number of volunteers has increased from 98 in 2006 (the year before I began as the Culpeper Extension Agent) to over 424 in 2018. This is an increase of 332.7%! From 2017 to 2018 the number of volunteers has increased from 306 to 424 which is an increase in one year of 38.6%.

In 2018 there were 6 new club leaders trained and 14 re-trained and supported, 4 camp chaperones trained, and numerous short term volunteers recruited and supported. One summer intern supported volunteers during summer workshops, camps, and the CMR Farm Show. The Farm Show is the event that host the largest amount of volunteers in one location at one time throughout the year ? parents, club leaders, show department heads, sale committee volunteers, and so on. This event takes year round planning and is the culmination of work for the livestock project clubs. This year there were over 200 animals on grounds with 123 being sold at auction, raising a total of $169,045.25. This shows the amount of local support from individuals and businesses for youth and the 4-H program in general in Culpeper County. Without our volunteer base, programs such as this would not be feasible.

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
80% of the fastest growing occupations in the United Stated depend upon mastery of mathematics and scientific knowledge and skills. Workers who hold STEM degrees enjoy higher earnings, and workers in STEM occupations are less likely to experience joblessness. Real world, interdisciplinary, project-based learning is a proven strategy for improving students? performance in STEM subjects. 4-H has a long tradition of engaging youth in real world, interdisciplinary, project-based learning, and as a result 4-H?ers worldwide are two times more likely to participate in STEM activities. These national trends have of course influenced Fauquier County schools priorities as well. Nikki Jenkins, Fauquier County Public School?s Science Supervisor has stated the importance of showing local students that STEM subjects are used on an everyday basis. Source: George Lucas Educational Foundation- Edutopia and 4-H Tufts Study

What has been done
2,675 Fauquier youth (90% of enrollment) completed at least one STEM project in 2017-2018. These projects fell under the following disciplines: animal science, horticulture, robotics, inventions, agriculture, coding, and biotechnology. Fauquier County offers 17 4-H clubs that all incorporate some kind of STEM component throughout the year. Examples of STEM club activities include dissection of cow stomachs, Hippology study sessions, tours of our local VDACS Lab, and preparation for VEX robotics competitions. To supplement our club offerings, I offer an annual embryology, horticulture, mobile maker space, and forestry school enrichment program to local classrooms. All of these programs target STEM SOL objectives.

Results
In an end of the year survey, 95% of parents responded that they saw an improvement in their child?s problem solving skills because of their participation in 4-H. 84% of parents responded that they saw an improvement in their child?s critical thinking skills because of their participation in 4-H. 4-H?ers responding to post-program surveys reported that because of their participation in 4-H STEM programs they: feel more comfortable working in teams to solve a problem ? 94%; feel more comfortable building things ? 100%; feel more comfortable gathering data ? 94%; feel more comfortable conducting experiments ? 94%; want to learn more about STEM ? 94%; want to pursue a career in STEM ? 82%. Local teachers have been especially grateful for the mobile maker space school enrichment offerings this year. One music teacher told me that she had never considered incorporating STEM into her lessons. After I brought one of our Mobile Maker Space activities into her class she told me that she has been pointing out her students stem abilities as they come up in her normal lessons. She has also invited me back to help her students learn about coding and creating their own instruments.

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The world is experiencing a health crisis with drug addictions, alcoholism, and smoking causing catastrophic effects. For youth, these effects are often the result of smoking/vaping, binge drinking, and illegal drug use. Unfortunately, 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 (2017), 8.2% (35,400) of high school students reported that they currently smoke cigarettes while 16.8% of high school students reported vaping (e-cigarettes). It was also reported that 3,700 youth under the age of 18 will become new daily smokers next year. Furthermore, 10,300 adult Virginians die every year from tobacco-related illnesses and sadly, 150,000 youth who are now under the age of 18 will die prematurely from smoking. The Campaign for Tobacco-Free Kids also reported that smoking kills more people that 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 and is targeted at youth between the ages of 10 and 15.

Results
In Virginia, 4,264 youth completed 10 or more hours of Health Rocks! programming. Of that total, 48.7% were girls and 51.3% were boys. Youth participants varied in grade levels (from 1st grade

to 12th grade). The majority of youth were in elementary school (57.8%), followed by middle school (35.6%) and high school (6.7%). 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, 90% of participants know that people who smoke or do drugs can have serious relational consequences (e.g. ruined relations what family and friends); 94% of participants are aware of the physical health consequences (e.g. die from lung cancer); and 90% of participants are aware of the cognitive consequences (e.g. have illusions). Skills in Managing Stress, Dealing with Peer Pressure and Making Positive Decisions ? 96% of 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 (93%) 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, 87% 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 94% 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 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. Regarding youth satisfaction with the program, over 92% rated the trainings as interesting and 923% stated that they learned a lot during the training. Over 96% said the staff members were friendly and over 93% said they actively participated in the training activities. Jonette Mungo- Over 1100 students received Health Rocks! training in Carroll County. Many had the belief that vaping was better than smoking a cigarette. The students at the Middle School particularly asked for more information about the dangers of vaping. On the day that I returned with the information for the students, several admitted seeing the devices on the school bus and in the bathroom at the school that day. Many did not know what those devices looked like prior to this training. The P.E. teachers, who deliver the majority of the curriculum to the students had never seen a JUUL before. The principal was immediately made aware and given materials to share with parents and teachers. Students are verbally reporting short term and mid-term changes in their parent's smoking behaviors. The most commonly reported changes have been parents no longer smoke in the home or vehicle and parents switching to e-cigarettes.

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
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research shows that Americans are concerned that young people do not have adequate communication skills to prepare them for success in the workforce. Additionally, teachers and administrators have asked Buckingham 4-H to help them enable their students to feel more comfortable, competent, and confident speaking in front of groups.

What has been done
Fourth, fifth, and sixth grade students in Buckingham County Public Schools participated in units on 4-H Presentations, 4-H Public Speaking, and 4-H Science Fair (a subset of 4-H Presentations), respectively. Fifth grade youth at Central Virginia Christian School also participated in Public Speaking, and middle school youth at Central Virginia Christian School presented Illustrated Talks. Community volunteers came in to judge the contests and award ribbons to the youth for their efforts. Youth completed written evaluations at the conclusion of the project.

Results
133 4th graders demonstrated proper techniques through presentations. They reported that because of doing the presentation, they were better able to speak in front of a group (70%), gather information & supplies necessary for demonstrating how to do something (70%); organize thoughts into a presentation (70%); teach and show others (86%), and felt better about themselves because of what they had achieved (70%). 141 5th graders delivered speeches in 2018. They felt more confident in their abilities to speak in front of a group (57%); developed better organizational skills (59%); understood how giving a speech helped them to communicate better (72%); and they felt greater self-confidence (74%). 38 middle school students presented illustrated talks. They indicated that as a result of completing the project, they felt better prepared to speak in front of a group (40%), felt more competent developing visual aids to inform others (57%), were better able to organize thoughts into a presentation (49%), and felt greater self-confidence (48%). 119 6th graders conducted an experiment using the scientific method and reported findings. Evaluations showed: understanding the scientific process 91%); gaining skills in self-motivation (79%); developing critical thinking skills (71%); honing skills in developing and giving an oral presentation (44%); and feeling good about their accomplishments (90%). The 6th graders also reflected on their growth in the area of communications over the three years. Seventy-seven percent reported that they felt the projects were worthwhile; 57% felt they had become more confident in their abilities to speak in front of a group with an additional 21% expressing uncertainty about their confidence levels. 46% expressed with certainty that they were better public speakers because of the three years of 4-H communications projects; 37%

were less certain but felt that these projects may have contributed to increased public speaking skills.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #9

1. Outcome Measures

Cultivating Appreciation for Nature and Food Origins: Interactive Farm Tours for K-12 students and teachers at VSU Randolph Farm

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2018	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In the 21st century, children spend more time indoors than outdoors in nature. A 2018 study from the Seattle Children?s Research Institute determined children from the ages of 10 to 16 spend a mere 12 minutes a day on outdoor activities, in comparison to nearly 10 waking hours being relatively motionless, such as sitting indoors, playing video games, or watching television. Social behavior studies point to significant stress reduction in ADHD children who spend time in outdoor activities. Additionally, less than 2% of Americans live on a farm and 48% of Americans do not know where their food was grown or how it was produced. Without a concerted effort of agricultural educators, the next generation may not appreciate nature in the form of a stress reduction or know where their food comes from.

What has been done
To provide a unique and positive outdoor experience focusing on farming and where food comes from, VSU College of Agriculture invited interested Kindergarten to High School teachers in Virginia to engage their students through an interactive, outdoor tour of VSU Randolph Farm. In 2018, 80 VSU Randolph Farm tours were conducted.

Results
As a result of the conduct of 80 VSU Randolph Farm tours, 2,300 (K-12) students and 250 adult teachers and chaperone volunteers increased awareness of the benefits of outdoor activities such

as farming, gardening, and raising poultry and small ruminants. 2,550 farm tour participants learned about where their food comes from and gained appreciation of agriculture and being outdoors. After participating in the farm tour which involved walking and touching plants and animals, 2,167 (85%) farm tour participants claimed the experience was relaxing and beneficial to their sense of well-being. Many of the participating schools are located in urban settings with 2,295 (90%) of participants never having an authentic farm experience. At the beginning of the farm tours, one-third of student participants (759) believed food came from a grocery store, but after tour participation, clearly understood food came from a farm. 250 adult tour participants believed the farm tour was important to incorporate into a well-rounded, general educational program (K-12).

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.