

2011 Virginia Polytechnic Inst. & State University and Virginia 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 which stimulates positive personal and societal change leading to more productive lives, families, farms, and forests, as well as a better environment in urban and rural communities.

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

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

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

Virginia Agricultural Experiment Station is committed to developing and implementing research that addresses society's needs and expectations. The College is focused on improving human and animal health and nutrition, enhancing the quality of the environment, reducing the effects of major infectious diseases, developing value-added products, building viable communities, and preventing chronic diseases such as obesity, heart disease, and diabetes. Research programs are conducted on the main campus as well as at the Agricultural Research and Extension Centers 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 AND REPORTING: VAES, VSUARS, and VCE address a broad range of problems and issues facing citizens of Virginia through focused research and educational programming. This is accomplished

and reported in VAES through the Current Research Information System (CRIS) and the College of Agricultural and Life Sciences through the electronic Faculty Annual Reporting System (eFARS). This system, used by VT and VSU faculty, includes annual program plans and reports focused on faculty goals, programs, outcomes, outputs, and other data. This system also provides accurate FTEs, contacts, outputs, and outcomes for each planned program. The foundation for Research and Extension programs are built on the identification and prioritization of strategic issues through annual situation analyses, which are accomplished through the examination of trends and emerging issues identified by local advisory groups (including Extension Leadership Councils) and Extension specialists. This analysis becomes the background and rationale for deciding which problems and issues will be addressed and reported on by VAES, VSUARS, and VCE.

Between fiscal years 2008 and 2011, the base state funds for VCE and VAES have been reduced by a total of 14.3%. In response, VCE embarked on a strategic plan in May 2009, which was completed in the fall of 2010. The process systemically examined Extension's core values and mission; defined community issues, trends, opportunities, and challenges; identified partners who are currently charged with addressing each issue; and delineated the role VCE should play in achieving desired goals.

In addition, VCE unveiled a restructuring plan in October, 2010 in response to budget cuts and Virginia General Assembly legislation that included the charge to "restructure and consolidate local offices in a manner that is financially and logistically beneficial while preserving delivery of critical programs in high priority areas." In early 2011, public displeasure with the restructuring plan resulted in increased state funding levels for VCE for FY 2012. The restructuring plan was abandoned, and VCE was able to hire 34 new county Extension agents and 3 new Extension specialists in 2011.

Pursuant to a budget amendment adopted by the General Assembly, the VA. Secretary of Education was required to provide an analysis of the Virginia Cooperative Extension Service (VCE) structure and various financial operating and reporting mechanisms. There were several key recommendations. One was to develop a more transparent reporting mechanism of research and extension funding. Another recommendation was to develop new Memorandums of Understanding between VCE and local governments. Another key recommendation was that the function of the State ELC be revisited to assure that it has the proper composition of stakeholders amongst its membership and can be a more effective conduit for information both to and from the field. It was felt that improved communication is needed between university leadership, localities, stakeholder (ELC) needs, to develop future programming and research efforts. College and VCE leadership is moving forward to address these recommendations.

REPORTING REQUIREMENTS: All Extension faculty (agents, specialists, and administrators) and program assistants submit individual program reports. Also, county/city employees supervised by VCE conducting Extension programs submit annual program reports. Summary reports are developed from the individual reports. All research faculty are required to propose peer-reviewed Experiment Station projects submitted to USDA/NIFA, and entered into CRIS. Researchers prepare annual progress and termination reports reviewed by the VAES director before being submitted to CRIS. In addition, all 2011 research and Extension faculty are required to submit an annual report through eFARS. This state-developed system documents teaching, research, and Extension accomplishments and impacts for individual, unit, college, and organizational review. Updates to eFARS and contact reporting in 2011 continue to better align planning and reporting with the 17 planned programs presented in this report.

PLANNED PROGRAMS: 1) Childhood Obesity, 2) Climate Change Natural Resources, 3) Family Finance and Community Viability, 4) Families, and Communities, 5) Food, Nutrition, and Health, 6) Food Safety, 7) Global Food Security and Hunger - Agricultural Management, Marketing and Policy, 8) Global Food Security and Hunger - Agricultural Systems; 9) Global Food Security and Hunger - Animals and Animal Products; 10) Global Food Security and Hunger - Biotechnology and Genomics; 11) Global Food Security and Hunger - Family Nutrition Programs; 12) Global Food Security and Hunger - Local Food Systems; 13) Global Food Security and Hunger - Pest Management; 14) Global Food Security and Hunger - Pest Management; 15) Global Food Security and Hunger - Plants and Plant Products; 16) Sustainable Energy; and 17) Youth Development.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	305.0	23.0	180.0	12.5
Actual	292.2	19.5	195.8	13.5

II. Merit Review Process

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

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

2. Brief Explanation

Virginia Agricultural Experiment Station

Rationale and Review Committee Structure - Research under the Hatch, McIntire-Stennis, and Animal Health and Disease Acts is 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 3. Virginia-Maryland Regional College of Veterinary Medicine.

For each VAES project proposal submitted, the assistant or associate VAES director 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. This research is reviewed by this policy, must fit within the mission of VAES, and is approved by the director. The VAES director or College of Agriculture and Life Sciences assistant director or associate director chairs the project review committee.

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

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

Proposal Submission and Review Procedures - The department/unit head transmits the approved project proposal to the chair of the project review committee for that college with following items

transmitted to the chair electronically: 1.) the proposal, 2.) the project leader's vita [2- page maximum], 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 Project Review Committee, which returns the Project Review Forms and comments to the chair by a specified date (after at least three weeks).

Proposal selection criteria include: 1.) proposed research relevance to the goals of 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) or anticipated economic importance, and 6.) the project leader's vita indicates the level of competence required for the proposed research.

Each reviewer recommends the proposal be: 1.) approved with no changes, 2.) approved with minor changes, 3.) revised and resubmitted, or 4.) rejected.

The chair forwards reviewers' comments to the project leader and department head prior to the review. The chair directs the 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 a written summary of the review committee comments 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, to the VAES director or associate director, who serves as chair. The chair forwards the proposal to the review committee and the subject matter department head, who is invited to participate in the review process.

Final Submission - The project leader complies with the recommendations of the Project Review Committee and submits the revised proposal to the department/unit head, accompanied by a letter delineating the changes made in response to the recommendations of the reviewers and/or a rebuttal for any recommendations, which the Project Leader does not accept. The project leader enters CRIS Forms AD-416 and AD-417 on the CRIS website.

The chair signs Form AD-416 and transmits the above items to the VAES director accompanied by a letter listing names of the reviewers and date of the oral review (if applicable). For McIntire-Stennis proposals, the Administrative- Technical Representative (A-TR) must sign Form AD-416, certifying the proposal complies with the purposes of the McIntire-Stennis Act.

The VAES director or associate director meets with the chair, department head, and project leader if there are any questions or concerns. 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, enters Form CSREES-2008, and transmits the proposal, CRIS Forms AD-416, AD-417, and CSREES-2008 electronically to CRIS/CSREES/USDA. The CSREES 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 CSREES project reviewer notifies the director, who confers with the project leader, department/unit head, and chair of the project review

After approval by CSREES, the director sends copies of Forms CSREES-166 (Project Review and Comment Sheet), AD-416, AD-417, and CSREES-2008 to the chair of the project review committee, department/unit head, and project leader. These documents, the proposal, and all pertinent correspondence are retained in the official project file in the VAES director's office for three years after termination of the project.

Program Review of VSU Agricultural Research

In March 2007, all programs at the School of Agriculture including those in Agricultural Research were reviewed by external experts. A six-member team selected by USDA-CSREES visited Virginia State University to conduct the review over a four-day period. The team reviewed programs, listened to faculty presentations, visited facilities, and talked to administrators. At the end of their visit, they made an oral presentation of their findings to faculty, staff and administrators. They also submitted a written report on the state of the School of Agriculture programs and made recommendations on the future direction of agricultural research at VSU. Implementation of these recommendations has already started.

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 to when developing a proposal. Proposal development and submission deadlines are governed by the following: 1) Review and approval of Request for Approval to Submit Proposal Form takes one working day, and 2) University review and approval takes up to five working days.

Review of Full Evans-Allen Proposal - A full proposal is submitted by applicant(s) to the Director of Research for review by external anonymous experts in the respective fields. The Director of Research's Office facilitates this process. The reviewers could be from Virginia Tech, other Land Grant Universities, or State and Federal agencies. 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.

Functions of the reviewers are: 1) to review all proposals for scientific and technical merit, 2) to ensure that all proposals fulfill the land-grant mission and priorities of the University, 3) to ascertain that what is being proposed lies within the full range of expertise and capability of the investigators and the University, not withstanding their official duties, responsibilities, and assignments, and 4) to assist applicants with acceptable proposals in locating outside peers to further review the proposals, if necessary for substance and overall quality. 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.

Extension Review Process

The review process for Extension covers all programs conducted by VCE. VCE Planned Program Teams (PPT) develop Extension programs. The PPTs review programs on an annual basis and make decisions to maintain, modify, or create new programs to meet the needs identified through external and internal stakeholder input. An annual situation analysis conducted by local Extension units with volunteer Extension Leadership Councils and other groups and a booklet of emerging trends and issues provided by specialists informs this process. Details on the annual programming cycle are found at: <http://>

VCE addresses a broad range of problems and issues facing citizens of the Commonwealth through focused educational programming. This is accomplished and reported through VCE's seventeen PPTs and three State Program Leaders who serve as partners for each PPT. A web-based planning and reporting system organized around the seventeen Planned Programs includes outputs and outcomes operationalized by annual program plans and reports. Plans are built on strategic issues through situation analysis. This process collaboratively determines social, economic, and environmental problems at local, regional, and state levels. This becomes the background and rationale for deciding which problems and issues will be addressed with VCE time, energy, and human and fiscal resources.

Problems and issues identified through situation analysis at the local level are communicated throughout VCE and educational program plans are developed by interdisciplinary PPTs composed of VT and VSU specialists and agents. These teams are organized around and reflect the breadth and scope of priority problems and issues facing the citizens of the Commonwealth. Program proposals identify programming outputs, outcomes, and an evaluation plan to be conducted by the PPTs. The program proposals are reviewed by VCE programming leadership.

Program proposals from PPTs are distributed to all agent and specialist faculty on the VCE intranet and electronic planning "buy in" process. Faculty select programs for their situation by providing specific information in a Personal Action Plan (PAP), which includes the amount of time they plan to devote to the program, the key audiences, the planned delivery and evaluation methods, how they plan to reach underserved audiences. At the end of the year, each local unit and campus faculty member completes an annual accomplishment report documenting program relevance, response, and results through a narrative and impact statements.

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

Brief explanation.

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

A systematic analysis of educational needs is integral for VCE program planning. Through situation analysis, needs of stakeholders are assessed, analyzed, and then shape program direction and plans. Traditional methodologies 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.

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 106 Extension units in Virginia have an organized local ELC and all Agriculture Research and Extension Centers (ARECs) have active advisory councils. At the state level, VCE works with stakeholders through the state Leadership Council (VCELC). The group includes volunteers representing 22 planning districts in Virginia, at-large members appointed by the director of VCE, leaders representing Virginia's diverse population, businesses, agencies, organizations, VCE District Directors, chairs of VCE FCS, and 4H leadership councils, VCE Director from VT, VCE Administrator from Virginia State University, and deans of VSU and VT Colleges of Agriculture including the associate dean for research. State and local ELC meetings are held at times and locations convenient for the membership.

Virginia is a large, diverse state and as such, meeting locations are geographically distributed to ease travel burdens for members. Travel expenses are covered by VCE administration for meeting attendance. A faculty member works directly with the VCELC to assist with organizational development and logistics. The VSU Extension program works with stakeholders through the VCELC for the systematic analysis of educational needs to plan Extension programs. To ensure that adequate stakeholder input is received from limited-resource and underserved audiences, VSU Extension is also informed by a VSU Agricultural Advisory Committee. Formed in 2008, the 15-member committee consists of members from agricultural commodity groups, the agri-business community, and public education. Other members include Extension professionals and volunteers, farmers, and a local legislator who advocates for the VSU School of Agriculture. All members work closely with or are aware of the needs of VSU's clients.

Advisory Committees informs teaching, research, and Extension programs within VSU's School of Agriculture **and research programs within VAES and the college**. VCE advisory committee member guidelines were used as a basis for selecting VSU Agriculture Advisory members. Committee members represent the Extension program areas of 4-H, agriculture and natural resources, and family and consumer sciences and are invited to serve by the Extension Administrators and Dean of the School of Agriculture. VCE and the ARECs have long facilitated grassroots involvement, buy-in, and ownership in local programs. VCE formally connects with the grassroots of the state through partnerships with local volunteer ELCs. For the Virginia Agriculture Experiment Station (VAES), volunteer advisory councils provide stakeholder input. These partnerships represent the diversity of local clientele, communities, and industries across the Commonwealth.

During 2010, Extension concluded a statewide strategic planning process. Virginia Cooperative Extension's strategic plan will guide Extension programs over the next five years. In total, Virginia Cooperative Extension hosted 48 dialogues at varying locations across Virginia that included traditional and nontraditional stakeholders. Virginia Cooperative Extension also hosted five sessions located at varying locations across the State during which the draft strategic plan (preliminary findings from listening sessions) were tested with participants to assure the plan accurately reflected their input. Over 1,200 individuals participated in the process, which resulted in a long-range plan that produces measurable impacts utilizing a program evaluation process that ustifies human and financial resource allocations.

On April 1, 2011, Dr. Edwin Jones joined Virginia Tech as Director of Virginia Cooperative Extension and Associate Dean of the College of Agriculture and Life Sciences. Dr. Jones has traveled throughout Virginia, and in each planning district has attended a forum, each hosted by a local ELC, through which ELC members and stakeholders have been given the opportunity to provide input into VCE's future direction. These forums have been hosted in every planning district in Virginia.

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

1. Method to identify individuals and groups

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

Brief explanation.

The Virginia Agricultural Experiment Station (VAES) conducts research relevant to the needs and priorities of the citizens of the Commonwealth. Research projects are established based on the input of advisory committees at each of the thirteen Agricultural Research and Extension Centers (ARECs) distributed across the state. The twelve academic departments within the College of Agriculture and Life Sciences each maintain stakeholder groups and the College has its own advisory committee of producers, commodity groups, and agribusiness leaders that provide important feedback to VAES. VAES provides research-based input to the VCE programming process through faculty research and Extension specialists and administratively through AREC directors and statewide Extension program leaders. VCE formally establishes connectivity with the grass roots of the state through partnerships known as Extension Leadership Councils (ELCs).

At the local level, this partnership represents the diversity of each county and city in which VCE exists as a resource. Representation includes VCE programming areas (4-H/Youth Development, Family and Consumer Sciences, Agriculture and Natural Resources and Community Viability), community leaders, and other organized community, agricultural, and youth associations and entities who partner with VCE. Extension staff and Leadership Council members work as equal partners to determine needs, establish program priorities, plan and implement solutions, identify and secure resources, market VCE and its programs, and evaluate and report program results/impacts to program stakeholders. Currently, all 107 Extension units in Virginia report having an organized local ELC. At the state level, local connectivity is achieved through the Virginia Cooperative Extension Leadership Council (VCELC). The partnership includes volunteer leaders representing the 22 planning districts of Virginia, at-large members appointed by the director and administrator, all VCE District Directors, all chairpersons of VCE state program leadership councils for FCS and 4-H, the VCE Director (VT), the VCE Administrator (VSU), the director of governmental relations at VT, and the deans of the 1862 and 1890 land grant colleges. Extension provides a formal mechanism for VSU and VT to receive stakeholder input for Extension and research programs. The situation analysis process in communities examines and determines what issues, problems, and opportunities exist that VCE resources should address (<http://www.ext.vt.edu/vce/support/process/situation.html>). An essential component of the process includes development of a unit profile (<http://www.ext.vt.edu/vce/support/unitprofiledata.html>). The unit profile developed by local agents is shared with ELCs to determine which key informants should be involved in situation analysis (<http://www.ext.vt.edu/vce/support/keyinterviews.doc>).

During the reporting period, Virginia Cooperative Extension concluded a strategic planning process involving over 1,200 traditional and nontraditional stakeholder groups. A committee of 25 identified state agencies, nonprofit and corporate citizens that were invited to attend one of three external stakeholder listening sessions. The cumulative list exceeded 350 leaders from organizations.

An additional 45 sessions were conducted across that state with key stakeholder groups such as the state Extension Leadership Council, local ELC chairs and internal groups including agents

and campus-based faculty. Open sessions were conducted in every planning district of the State with open invitations posted in newspapers and announced through the utilization of social marketing, newspaper and radio announcements. Posters announcing sessions and extending an invitation to participate were distributed and posted throughout every county/city in the State.

April 1, 2011, Dr. Edwin Jones joined Virginia Tech as Director of Virginia Cooperative Extension and Associate Dean of the College of Agriculture and Life Sciences. Dr. Jones has traveled throughout Virginia, and in each planning district has attended a forum, each hosted by a local ELC, through which ELC members and stakeholders have been given the opportunity to provide input into VCE's future direction. These forums have been hosted in every planning district in Virginia, with the events being advertised in the same manner as the strategic planning sessions.

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

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- Other (focus groups, key informant interviews, public issues forums, listening sessions)

Brief explanation.

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

Virginia Cooperative Extension hosted 48 strategic planning dialogues, including over 1200 traditional and nontraditional stakeholders. Through a structured, facilitated process, input was solicited with results being used to guide Extension programming over the next five years.

On April 1, 2011, Dr. Edwin Jones joined Virginia Tech as Director of Virginia Cooperative Extension and Associate Dean of the College of Agriculture and Life Sciences. Dr. Jones has traveled throughout Virginia, and in each planning district has attended a forum, each hosted by a local ELC, through which ELC members and stakeholders have been given the opportunity to provide input into VCE's future direction. These forums have been hosted in every planning district in Virginia.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- In the Action Plans
- To Set Priorities

- Other (staff professional development)

Brief explanation.

Input from stakeholders involved in situation analysis and strategic planning is utilized to shape Extension programming from a state and local perspective. Issues that are identified are researched in a collaborative process involving campus and field based faculty, with curriculum developed to shape educational programming delivered throughout Virginia by agents and volunteers. Identified needs and resulting educational programming frame Extension's budget, action plans, priorities as well as volunteer and staff development needs. Input also shapes the plan of work for VCE, VAES and VARS.

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. Additional forums conducted by the Director of Extension this past reporting year validated our strategic planning results. 2011 - 2016 Focus Areas and Goals, all established with stakeholder input follow:

2011-2016 Focus Areas and Goals

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.

Focus Area V: Cultivating Community Resiliency and Capacity

- Assist communities in developing and strengthening local economies through entrepreneurship and small business development.
- Develop and deliver educational programming to improve capacity among community members to engage in community planning, decision-making, and community leadership.

Focus Area VI: Organizational Effectiveness

- Implement the programming, local structure, and organizational structure from the 2010 Restructuring Plan.
- Invest in the recruitment and development of a diverse group of VCE educators, specialists, and staff to ensure exceptional programming, services, and leadership that addresses Virginia's needs.
- Develop an effective internal and external communication system to inform and engage citizens, stakeholders, and partners.
- Identify and secure public and private resources that support quality programming in the focus areas.

A similar planning process to identify goals and objectives for agricultural research is currently underway as part of a college-wide strategic planning process.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
7113224	2364247	5158430	2790350

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	3311372	2364247	4153681	2540723
Actual Matching	10977062	2354674	11964853	2790350
Actual All Other	27788268	547057	48194912	454969
Total Actual Expended	42076702	5265978	64313446	5786042

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	0	0	0	394634

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Childhood Obesity
2	Climate Change and Natural Resources
3	Family Finance and Community Viability
4	Families and Communities
5	Food, Nutrition, and Health
6	Food Safety
7	Global Food Security and Hunger - Agricultural systems
8	Global Food Security and Hunger - Animals and Animal Products
9	Global Food Security and Hunger - Agricultural Management, Marketing and Policy
10	Global Food Security and Hunger - Biotechnology and Genomics
11	Global Food Security and Hunger - Family Nutrition Program
12	Global Food Security and Hunger - Local Food Systems
13	Global Food Security and Hunger - Pest Management
14	Global Food Security and Hunger - Plants and Plant Products
15	Sustainable Energy
16	Youth Development

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Childhood Obesity

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
702	Requirements and Function of Nutrients and Other Food Components	20%	0%	35%	0%
703	Nutrition Education and Behavior	40%	70%	35%	0%
724	Healthy Lifestyle	40%	30%	30%	0%
	Total	100%	100%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	10.9	1.0	7.5	0.0
Actual Paid Professional	4.8	1.0	5.2	0.0
Actual Volunteer	410.0	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
50824	267002	97283	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
168479	223449	280228	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
426501	0	1128769	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct educational classes, workshops, short courses, meetings, seminars, and trainings for children, parents, teachers, school nutrition staff, and health and other professional groups; develop curriculum, newsletters, and other educational resources; establish and implement train-the-trainer models to promote educational opportunities; facilitate local and statewide coalitions and/or task forces; conduct assessments and community surveys; partner with community agencies and institutions to facilitate programs and community development; contribute to the creation/revision of social systems and public policies; conduct research studies and disseminate program and research results to both the professional community and lay public through journal articles, papers, reports, and public media; develop and implement social marketing campaigns using various outlets to promote program participation, with special attention to underserved and disadvantaged audiences; disseminate research-based information to lay audiences and address emerging needs using a variety of media and innovative technology resources; cooperate with media and other community agencies to seek effective means of targeting new and nontraditional audiences; and respond to consumer inquiries.

2. Brief description of the target audience

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

3. How was eXtension used?

Individual agents and specialists are signed up to take questions as experts through the Ask-an-Expert system in the area of childhood obesity and nutrition.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3345	6842	21212	776

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	7	4	11

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Childhood Nutrition and Fitness - Number of pre-school age youth participating in Extension nutrition education, physical activity, or other obesity-prevention programs at childcare centers or schools.

Year	Actual
2011	727

Output #2

Output Measure

- Childhood Nutrition and Fitness - Number of elementary, middle, and high school-age youth participating in Extension nutrition education, physical activity, or other obesity-prevention programs in school, after-school, or recreational settings.

Year	Actual
2011	67658

Output #3

Output Measure

- Childhood Nutrition and Fitness - Number of Head Start and preschool teachers, day care providers, elementary and secondary school teachers, school nurses, school food service managers, and school health and wellness committee members participating in Extension training for implementing nutrition education, physical activity, and other obesity-prevention programs reaching children and their parents.

Year	Actual
2011	1379

Output #4

Output Measure

- Childhood Nutrition and Fitness - Number of youth exposed to healthy eating and physical activity messages from extension-led social marketing campaigns

Year	Actual
2011	112000

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Childhood Nutrition and Fitness - Number of pre-school age youth who try more new foods, consume more fruits and vegetables, eat a wider variety of foods, or increase their physical activity after participation in an Extension nutrition education, physical activity, or other obesity-prevention program at a Head Start or child care center or school.
2	Childhood Nutrition and Fitness - Number of select elementary, middle, or high school age youth who gain knowledge and awareness of nutrition, physical activity, or positive body image or improve at least one health- related behavior after participation in an Extension nutrition education, physical activity, or other obesity-prevention program in a school, after-school, or recreational setting.
3	Childhood Nutrition and Fitness: Number of Head Start and preschool teachers, day care providers, elementary and secondary school teachers, school nurses, school food service managers, and school health and wellness committee members participating in Extension training who implement a nutrition education, physical activity, or other obesity-prevention activity in their preschool, elementary or secondary school, or after-school or recreational setting.
4	Childhood Nutrition and Fitness - Number of youth who demonstrate dietary and physical activity improvements based on healthy eating and physical activity messages from extension-led social marketing campaigns

Outcome #1

1. Outcome Measures

Childhood Nutrition and Fitness - Number of pre-school age youth who try more new foods, consume more fruits and vegetables, eat a wider variety of foods, or increase their physical activity after participation in an Extension nutrition education, physical activity, or other obesity-prevention program at a Head Start or child care center or school.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	383

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

An estimated 13.9% of preschool-aged children in the United States are overweight. Good nutrition and physical activity is important to the growth, development, and emotional well-being of young children and to prevent childhood overweight.

What has been done

VCE Educators conduct a wide variety of age-appropriate programs for pre-school aged youth, including the Food Friends and Mighty Moves program. Food Friends and Mighty Moves, a 12-week multi-faceted awareness and education program, promotes healthful habits, literacy, and skill building among preschool-aged children by encouraging children to try new foods and new physical activities. A few new programs were offered this year for this audience, including Back to School: Back Outside, designed to expose children to nature, create a personal connection with the environment, and promote time spent outdoors and free play, and Organwise Guys.

Results

Teachers reported improvements in the following areas: children trying more new foods; children eating more fruits and vegetables; children eating a wider variety of foods, children acquiring important fine and gross motor skills, children being exposed to nature, and children moving more. Overall, the VCE programs were found to inspire changes to young children's dietary and physical activity knowledge, attitudes, and behaviors.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Childhood Nutrition and Fitness - Number of select elementary, middle, or high school age youth who gain knowledge and awareness of nutrition, physical activity, or positive body image or improve at least one health- related behavior after participation in an Extension nutrition education, physical activity, or other obesity-prevention program in a school, after-school, or recreational setting.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	61181

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Recent data indicate 17% of children and adolescents are obese. Obese children are more likely to have high blood pressure, high cholesterol, and type 2 diabetes, and a tendency to be overweight and obese as adults. Childhood obesity also has social, psychological, and economic consequences. Large children report lower self-esteem, sadness, marginalization, and lower quality of life than healthy weight children and cost approximately \$72 more per year in health-related costs.

What has been done

VCE-Family and Consumer Sciences programs reached 61,181 Virginia youth and families through educational programs focused on food, nutrition, and health. Extension Educators partnered with local and state agencies, including schools, to provide numerous education programs across the commonwealth annually, including: Chefs Clubs in Middle School Cafeterias, which offered hands-on cooking activities to students; Cooking Matters, a family-based cooking and nutrition program; Healthy Weights for Healthy Kids, a program aimed at youth between 7 and 14 years old to prevent childhood obesity; and an initiative to increase fresh,

local produce in a local school lunch program.

Results

The Chefs Clubs encouraged student chefs to try new foods and create healthy, seasonal foods, aligned with MyPlate. An evaluation of Cooking Matters found that every participant reporting learning one new thing as a result of the class and enjoyed family-based cooking. There was a 14% increase in the number of individuals who reported using the food label too. Finally, Healthy Weights for Healthy Kids has consistently found that children: increase fruits and vegetables eaten (by 85%); limit sweet snacks (82%); read food labels (83%); and consume more milk (94%).

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Childhood Nutrition and Fitness: Number of Head Start and preschool teachers, day care providers, elementary and secondary school teachers, school nurses, school food service managers, and school health and wellness committee members participating in Extension training who implement a nutrition education, physical activity, or other obesity-prevention activity in their preschool, elementary or secondary school, or after-school or recreational setting.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1235

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Recent data show that 17% of children 6 to 19 years old, and 35.7% of adults are obese. Obese children are more likely to become obese as adults, at a rate as high as 50%, and have higher risk for numerous emotional and health consequences, including stigmatization, lower perceived

quality of life, type 2 diabetes, osteo-arthritis, and sleep apnea. Childhood obesity also has a huge economic impact on Virginia and the nation. It is estimated to cost \$14.1 billion in outpatient costs and \$237.6 million in inpatient costs every year.

What has been done

Extension Educators partnered with childcare centers, schools, and other local and state agencies and non-profit groups to train volunteers to teach numerous education programs for youth on nutrition and physical activity to address childhood obesity and to expand the reach of extension programs.

Results

A large number of trainings were conducted by Extension Educators on a wide variety of programs, including Movement with Preschoolers, Beyond the Baby Fat, Food Friends and Mighty Moves, Organwise, and Healthy Weights for Healthy Kids, to enable partners to offer childhood obesity programs at their childcare centers, camps, and other locations. As part of SNAP-Ed, a sample of volunteers reported that 86.7% of youth who participated in their classes showed improvement in eating more fruits and vegetables. 85.9% showed improvement in getting more physical activity.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Childhood Nutrition and Fitness - Number of youth who demonstrate dietary and physical activity improvements based on healthy eating and physical activity messages from extension-led social marketing campaigns

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	112000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Recent data indicate 17% of children and adolescents are obese. Obese children are more likely to have high blood pressure, high cholesterol, and type 2 diabetes, and a tendency to be overweight and obese as adults. Childhood obesity also has social, psychological, and economic consequences. Large children report lower self-esteem, sadness, marginalization, and lower quality of life than healthy weight children and cost approximately \$72 more per year in health-related costs.

What has been done

A social marketing campaign promoting healthy eating and physical activity based on the logo, Eat Smart, Move More. VA Tech Hokies Do, was conducted in Virginia. Children frequently have athletes who are their role models. The campaign consisted of billboards throughout Virginia where there is a high level of poverty, posters on buses traveling through high poverty areas, and posters distributed throughout Virginia in schools where there is a high level of poverty, and a web presence.

Results

6,713 youth were surveyed to obtain information about the impact of the social marketing campaign on their attitudes and behaviors. 82% indicated that they were likely to follow the suggestions for eating smart and moving more. 88% of youth believed they could be an athlete by eating smart and moving more.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- 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 (Loss of county agents)

Brief Explanation

The economy (i.e. employment opportunities, etc.), as well as gas prices (which can, in turn, increase food prices) can directly influence food purchases and food security of families and caregivers of children and furthermore weight status.

Public policy changes, particularly those directed at children, can also effect dietary

and physical activity status of children. For example, the Healthy Hungry-Free Kids Act (Child Nutrition & WIC Reauthorization Act of 2010) has recommended dramatic changes to foods offered at schools participating in the USDA school breakfast and lunch programs, along with funding for farm-to-school programs. Further, Virginia is currently considering legislation that would mandate physical education everyday in Virginia schools, thereby increasing the quantity of physical activity of all Virginia children attending schools, along with removing the mandate for every school division to have a School Health Advisory Board. While these changes did not influence impacts or outcomes from 2011, they demonstrate the potential for external policy factors influencing children's behaviors.

Several populations, particularly Hispanic and African American individuals, have higher rates of obesity. With population shifts within Virginia, it is possible to see changes in childhood obesity prevalence rates.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

All major programs relating to children and youth are evaluated to determine program effectiveness, although outcomes may not be available from all locations statewide.

This past year, a pilot-study was conducted with youth EFNEP to test a newly created instrument to evaluate the effectiveness of the Healthy Weights for Healthy Kids program on children's self-efficacy and behavior. During 2012, a full study will be conducted, using this instrument, to examine the cost-effectiveness of this program within Virginia.

Additionally, another study, Smart Choices for Healthy Families, was completed this past year, using the Healthy Weights for Healthy Kids program, in conjunction with an adult educational program, with low-income families. The program included a brief physician referral, the combined parent-child program, and automated telephone calls with reminders about the program's key, tailored messages. From baseline to three months, there was a significant decrease in the child's BMI. The results were published in the Health Education and Behavior in 2012.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Climate Change and Natural Resources

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	10%	10%	10%	0%
102	Soil, Plant, Water, Nutrient Relationships	10%	10%	10%	0%
104	Protect Soil from Harmful Effects of Natural Elements	10%	10%	10%	0%
111	Conservation and Efficient Use of Water	5%	5%	5%	0%
112	Watershed Protection and Management	10%	10%	10%	0%
123	Management and Sustainability of Forest Resources	15%	15%	15%	0%
124	Urban Forestry	5%	10%	5%	0%
131	Alternative Uses of Land	10%	10%	10%	0%
133	Pollution Prevention and Mitigation	10%	10%	10%	0%
135	Aquatic and Terrestrial Wildlife	10%	10%	10%	0%
403	Waste Disposal, Recycling, and Reuse	5%	0%	5%	0%
	Total	100%	100%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	24.0	1.0	18.7	1.0
Actual Paid Professional	19.4	1.0	20.9	0.0
Actual Volunteer	2332.0	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
204875	78520	392156	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
679153	86952	1129623	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1719265	0	4550166	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, 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, landowners, mill owners and workers, private consultants and companies, local governmental and state officials, waste water treatment operators, state and federal agencies, nongovernmental organizations, professional associations and societies, and community groups.

3. How was eXtension used?

A Community of Practice is currently being developed under the leadership of Dr. John Munsell for eXtension for Agriforestry. Their first organizational meeting was just held and they hope to be in full operation within 18 months.

In addition Extension agents working forestry and natural resources as well as specialists serve as experts in the Ask-an-Expert system. We have multiple AaE widgets on unit and state extension websites for the purpose of answering questions from clients in the area of climate change and natural resources.

V(E). Planned Program (Outputs)

1. Standard output measures

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	18	60	78

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational programs offered.

Year	Actual
2011	444

Output #2

Output Measure

- Number of educational materials and curriculas developed

Year	Actual
2011	79

Output #3

Output Measure

- Number of applied research projects.

Year	Actual
2011	108

Output #4

Output Measure

- Acres of land exposed to educational programming efforts.

Year	Actual
2011	180000

Output #5

Output Measure

- Identifiable impacts reported by agents/specialists

Year	Actual
2011	164

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increased number of people adopting at least one new or improved land management practices.
2	Improved natural resource industries that contribute to community viability.
3	Number of participants learning about the quality of their private water supply and about private water system maintenance by participating in a county-based Virginia Household Drinking Water Program water testing clinic.
4	Increase in the number of individuals who gain knowledge as certified nutrient management planners in turf and landscape systems.
5	Increase in the number of acres covered by nutrient management plans in turf and landscape systems due to participation in Extension educational programs.
6	Increase in the tons of compost produced from organic wastes typically land-applied (manure, biosolids) or land-filled (yardwaste, biosolids, industrial sludge) as a result of increased knowledge and skills.
7	Increase in the number of people directly impacted by new or improved land management practices
8	Increased public awareness of climate change, biodiversity, and ecosystem services.
9	Increased number of stakeholders involved in community natural resource management and decision-making.
10	Increase program participants understanding of raw material conversion and modern business management practices.
11	The general public, landowners, and loggers use the forest in alternative and traditional ways to increase value and profit.
12	Increase in the number of acres directly impacted by new or improved land management practices.
13	Number of projects assembling transcriptomes for vertebrates and invertebrates from the Southern Appalachian Mountains

Outcome #1

1. Outcome Measures

Increased number of people adopting at least one new or improved land management practices.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	457

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Relevance: Of Virginia's 25 million acre land base, 15.8 million acres, or 63%, is forested. These forested areas generate over \$25 billion annually for the commonwealth's economy, and an additional \$5.1 billion in environmental benefits (e.g., clean air and water, wildlife habitat, carbon sequestration). The majority of these lands, 10.1 million acres, are privately owned family forests.

What has been done

The Virginia Forest Landowner Education Program (VFLEP) coordinates numerous educational opportunities for private forest landowners across the commonwealth. Events include short courses, field tours, and workshops, and are hosted with numerous state-wide partners, including state and federal natural resources agencies, land trusts, Virginia Tree Farm Committee, Sustainable Forestry Initiative SIC, and private consulting foresters. All educational opportunities are intended to empower landowners to make wise decisions regarding the management of their forest resources, with particular emphasis on obtaining a written forest management plan.

Results

In 2011, VFLEP offered 13 short courses, field tours and workshops to 590 landowners. Between 400-500 new Forest Stewardship Plans are written each year in Virginia, representing between 40,000 and 66,000 forested acres annually. Although not all participants in VFLEP programs seek a written management plan, the programs do increase awareness of the plans and their importance. According to exit evaluations, over 80% of VFLEP program participants plan on

seeking more information on management planning as a result of attending the program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
123	Management and Sustainability of Forest Resources
124	Urban Forestry
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
403	Waste Disposal, Recycling, and Reuse

Outcome #2

1. Outcome Measures

Improved natural resource industries that contribute to community viability.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	39

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small, rural businesses (e.g. tourism & agritourism operators, artisans, craftspeople, mom and pop? restaurants) face many challenges, especially when it comes to marketing and advertising their products and services. Business owners may be preoccupied with traditional? forms of advertising, which can be expensive and do not always target intended audiences. Furthermore, some areas of the Virginia, including regions along the Blue Ridge Parkway, do not permit some forms of traditional advertising (roadside signage).

What has been done

Advances in technology are resulting in a revolution in advertising options. Location and place-based services, made possible through the use of global positioning system (GPS) devices (including portable, in-dash car navigation systems, and smartphone devices) can be used to geographically connect potential consumers with nearby businesses. This program walks business owners through the process of registering their businesses on ten national business databases. These databases are then consumed by a variety of location-based service (GPS) applications (TomTom, Garmin, iPhone/iPad/Blackberry/Droid and other GPS supported applications). Through the workshop, participants will also learn how to leverage free, online tools to support Internet marketing efforts.

Results

At the conclusion of this program, 100% of participants have registered their businesses on national business databases. Approximately 65% of business owners corrected information associated with their business, and 82% of participants plan on using other forms of location based services and crowd sourcing to support their business. One participant experienced a 50% increase in sales over the previous year, which he directly attributed to information acquired through this program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
124	Urban Forestry

Outcome #3

1. Outcome Measures

Number of participants learning about the quality of their private water supply and about private water system maintenance by participating in a county-based Virginia Household Drinking Water Program water testing clinic.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	940

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The majority of households in 60 of Virginia's 95 counties rely on private water supply systems, such as wells, springs and cisterns: some 1.7 million households statewide. In 52 counties, the number of households using private wells is increasing faster than the number connecting to public water systems. 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 real implications for water quality, longevity of the water system, and ultimately, the health and safety of the families who rely on these systems.

What has been done

The Virginia Household Water Quality Program provides assistance to private water system users through county-based drinking water clinics. Working with local VCE educators, faculty in the Biological Systems Engineering (BSE) department coordinate clinics in 12-16 counties each year. Information is provided about groundwater, as well as protection and maintenance of wells, springs, and cisterns used for private water supply. At a kickoff meeting, clinic participants receive water sampling kits and instructions about how to collect a sample from their well or home tap. Analysis, performed in the BSE Water Quality Lab, includes testing for 11 chemical constituents and for the presence of potentially harmful bacteria. Test reports, an explanation of the results, and possible treatment options are presented to clinic participants at an interpretation meeting.

Results

A survey of 75 (23%) participants at the clinic in Spotsylvania and Stafford Counties found:

19 % will seek additional water testing or information from a laboratory

36 % will determine the potential source of a problem with their water

22 % will pump out their septic system

17 % will grade area around their well or perform maintenance on well

10 % will reduce herbicide or fertilizer use around well or spring

29 % will shock-chlorinate water system

0 % will obtain a new water source

5 % will purchase or rent water treatment equipment

23 % will improve functioning of existing water treatment equipment

15 % will begin to use bottled water for drinking and/or cooking

89 % will plan to share the information they learned about their water supply with friends, family, and neighbors. On average, each respondent reported that they will share some of this information with 4.3 contacts, for a total of 281 individuals.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Increase in the number of individuals who gain knowledge as certified nutrient management planners in turf and landscape systems.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	41

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

What has been done

By state law, all of these nutrient management plans must be written by certified nutrient management planners. Individuals who might become certified to write nutrient management plans include representatives of private (e.g. fertilizer dealers, agricultural consultants, biosolids applicators) and public (e.g., Virginia Department of Conservation and Recreation, Natural Resource and Conservation Service) sector organizations and agencies. Twice a year we conduct a two day science-based training on soils and crop production that the planners undergo before taking the nutrient management exam

Results

These planners and those certified in previous years wrote over 200,000 acres of nutrient management plans for permitted farms this year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #5

1. Outcome Measures

Increase in the number of acres covered by nutrient management plans in turf and landscape systems due to participation in Extension educational programs.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	200000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Soil testing forms the basis for accurate nutrient and lime applications to agricultural and urban soils. This helps farmers, homeowners and custom fertilizer application companies meet crop or plant nutrient requirements without over applying nutrients. The over application of nutrients is financially wasteful and can damage water quality through nutrient movement into rivers, streams and the Chesapeake Bay. In 2006-2007, Virginia consumed 848,397 tons of fertilizer worth several hundred million dollars. With such a large volume of fertilizer use in the state, accurate utilization is imperative financially and environmentally.

What has been done

In the past year the soil testing laboratory has analyzed soil samples from every county in Virginia, totaling over 50,000 samples from about 12,000 clients.

Results

All users of the lab were surveyed and 235 responded. Of these, 90% closely followed fertilizer and lime recommendations made by the Soil Testing Laboratory (STL). This indicates a high level of trust in our sample analysis and recommendation procedures. We found that the STL is well

integrated with other extension resources, with 39% of our clients also having contact with agents, 16% with specialists and 33% using our online resources. We were the only contact with Virginia Cooperative Extension for 39% of our clients. Overall we had a 90% satisfaction rating. One main complaint was the lack of electronic reporting of results, which we are currently working to implement.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
133	Pollution Prevention and Mitigation

Outcome #6

1. Outcome Measures

Increase in the tons of compost produced from organic wastes typically land-applied (manure, biosolids) or land-filled (yardwaste, biosolids, industrial sludge) as a result of increased knowledge and skills.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	150

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Municipal, agricultural, and industrial organic wastes can be sources of excess nutrients, anthropogenic toxic compounds, and animal and plant pathogens, whose direct application to land may impair soil health and water quality. Composting is a process that biologically converts raw organic wastes into stabilized organic matter with the potential to eliminate pathogens and breakdown organic toxicants to less harmful compounds while generating a value-added soil amendment.

What has been done

We conducted educational programs to train waste by-product managers to properly compost, how to assess compost quality, and how to use the finished compost product in the mid Atlantic

region, especially in urban and disturbed soils.

Results

Due to our work there has been an increased amount of waste composted and finished product being used to amend soils in the mid Atlantic region. An outcome of outreach through the EPA Region III Food Waste Compost focus group is a joint grant proposal written to the EPA and funded for approximately \$8000 by a Virginia Beach Restaurant Owner and The Virginia Aquarium and Marine Science Center, a 503 C corporation, to set up a pilot food waste to compost collection and transfer project amongst a few restaurants on the VA Beach Ocean Front. A hauler is picking up food waste weekly from the mainly restaurant participants and hauling the food waste to a composting facility in Waverly Virginia. Data records are to be kept and maintained on the waste collected and other important information. Data from this collection will be used to determine further food waste collection and transfer applications on a commercial scale.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
403	Waste Disposal, Recycling, and Reuse

Outcome #7

1. Outcome Measures

Increase in the number of people directly impacted by new or improved land management practices

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1250

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Seeking feedback from landowners participating in Virginia's Forest Landowner Education programs through Central District Extension ANR/Natural Resources Extension Agent delivery is

crucial to gaining insight on measuring the effectiveness of programming. Landowners participating in Extension Forestry programs consistently indicate on exit evaluations what they would like to see improved or conducted in future programs. It is both rewarding and critical today to provide collaborators and Extension Administration this information to gauge actions taken as a result of our programming.

What has been done

Agent sought and received grant funds from the Bradley-Murphy Trust Fund to purchase postage to conduct a mail survey for all participants of Central District Extension Forestry programs since 2006. Fifteen participants responded via e-mail and 135 by regular mail, and all participants were asked a series of questions regarding income, acreage, and actions taken as a direct result of having attended one or more Virginia Forest Landowner Education and Central District Extension landowner programs.

Results

A five-year input survey from 2006 to 2011 on impacts realized from landowner participation in Extension Forestry programming bolstered a 47% response rate (135 out of 285) and revealed 60% of participants either obtained or updated a forest management plan for their property. Over \$580,000 was reported in timber income from both harvests and improvement thinnings. Twelve landowners indicated 206 acres involved small forest products enterprises to include ginseng, shiitake mushrooms, charcoal, and portable sawmill utilization, which combined generated over \$12,000 in reported income. Conservation efforts reported from our landowners indicated over 4,100 acres were enrolled into a conservation easement that allows sustainable timber management, and over 1,450 acres have instituted one or more forms of plant invasive species management, which leads to more timber and non-timber forest product growing space for landowners. Lastly, water quality best management practices were reported to have been conducted through riparian buffer tree plantings and seeding logging roads and deck areas on a total of 121 acres and 312 acres respectively.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
124	Urban Forestry
131	Alternative Uses of Land
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
403	Waste Disposal, Recycling, and Reuse

Outcome #8

1. Outcome Measures

Increased public awareness of climate change, biodiversity, and ecosystem services.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	2500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sustainable use of forests as a natural resource is rooted in their renewability as a producer of raw material and the simultaneous benefits they provide related to wildlife habitat, aesthetic benefits, recreational opportunities and ecosystem services such as clean water and air. These basic tenets are often unknown, misunderstood and undervalued by the general public. Public opinion plays an increasingly important role in the ability of both public and private land managers to effectively manage forestland.

What has been done

Historically significant sites, such as James Madison's Montpelier, provides a unique opportunity to reach a sector of society who may not otherwise seek to build a research based natural resources related understanding and appreciation (Munsell, 2009). Development of a Working Woods program began in 2008 with social research exploring the interest of Montpelier visitors to learn about forest resources while there. Field work was also conducted to develop an interpretive trail. Most recently, a cadre of Master Naturalist have been recruited and trained to develop and deliver interpretive programs to various audiences.

Results

The Montpelier Working Wood Cadre is 18 persons strong and has developed and delivered a variety of interpretive walks and conducted various management activities to enhance the educational experience. Forty individuals have participated in the three regularly scheduled Working Woods Walks growing from a slow start of six on the first walk to 20 on the last walk of the year. An additional 40 persons were reached by way of a field-tour for the Master Naturalist Conference and twelve youth engaged with the working woods and the volunteer leaders as part of a 4-H Day Camp. In 2011, 108 hours of volunteer time was spent on forest management work in

addition to the 182 hours contributed in planning and delivery, a combined value of \$6388.70.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
124	Urban Forestry
131	Alternative Uses of Land

Outcome #9

1. Outcome Measures

Increased number of stakeholders involved in community natural resource management and decision-making.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Environmental groups often portray all forest management and harvesting activities as harmful to the environment. Therefore teachers need to examine issues relating to forest management and use, minimization of environmental impacts, and production of goods used by society. Virginia's natural resources are a major component of the 4th and 6th grade, life science, and biology Standards of Learning (SOLs). Teachers can address SOLs using the forest and forest products as methods and avenues to enhance standard lesson plans and activities.

What has been done

To enhance teacher knowledge of natural resource issues, a four day and three evening field program for teachers was developed and marketed. Two news articles were developed and sent to the associated press. A webpage was developed on the VCE webpage and it was included in all advertisements. A brochure was created and sent to school systems and posted on the VCE webpage. The program was included on the Virginia Naturally web page in a listing of statewide summer teacher institutes. The event was advertised to teachers through the VA AG Ed list serve and PLT list serve. The program was highlighted in the Virginia Association of Science Teachers newsletter.

Results

Through these intense and multifaceted marketing efforts, eight teachers from across the state attended the 2011 Trees to Products program. A post program evaluation indicated all teachers would utilize the information gained to improve existing lesson plans and/or create new lesson plans. They also indicated their ability to implement grade level SOLs improved to a great extent. Therefore, students across Virginia should gain a better understanding of natural resource issues because teachers attended this program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
124	Urban Forestry
131	Alternative Uses of Land
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife

Outcome #10

1. Outcome Measures

Increase program participants 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
2011	840

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia is anticipating a rapid growth in consumption of woody biomass for energy. A total of 6 new facilities across the state are planned, or already under construction which would utilize woody biomass to produce electricity. Assuming all of these facilities come online as expected, in the next two years there will be an increase in biomass consumption of approximately 3 million tons per year. Many logging businesses are considering adding a chipper to their existing operations to begin producing biomass for energy from logging residues such as limbs, tops, and otherwise unmerchantable trees.

What has been done

As many logging businesses try to decide if biomass harvesting will be a good fit for their operations, the Virginia SHARP logger program developed a continuing education workshop to provide additional information to logging business owners. The workshops included an overview of utilizing woody biomass for energy, a summary of the projects announced or under construction in Virginia, and research results from a survey of Virginia loggers currently producing woody biomass. Research results included characteristics of harvesting equipment as well as owners attitudes towards biomass harvesting and whether it was beneficial for their business.

Results

The biomass harvesting workshop has been offered so far at three locations with 155 total participants. Many of the participants were logging business owners that were not currently harvesting biomass. An evaluation of the workshop indicated that the information provided was useful in helping owners to decide if they would like to begin harvesting biomass. Among the logging business owners that were currently considering whether or not to begin harvesting biomass, 80% indicated they were more likely to decide to harvest biomass after attending this workshop.

4. Associated Knowledge Areas

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

Outcome #11

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Profitability margins of owning forestland and extracting raw materials from woodland have steadily decreased as a result of slower market growth in relationship to the cost of owning and working the land. Furthermore, profitable utilization of low-grade wood remains a challenge. Small scale production of natural charcoal presents a niche business opportunity to wood handlers to add value. The natural charcoal most widely available throughout Virginia comes from outside of the State.

What has been done

“Local Fuel for Local Food” is a branded marketing opportunity developed by the Commonwealth’s Colliers Team to help market this product. “Green Grillin’” was designed and developed as the product label/brand for locally produced charcoal in Virginia. Demonstrations, workshops and product samplings have been held throughout Virginia at Farmer’s Markets, Bar-B-Que events and stand-alone venues. These events purpose to recruit and train new producers as well as educate potential consumers about the products superior qualities and environmental benefits.

Results

Since 2008, eight producers have made one or more batches of charcoal on their own. To test the markets, sales at farmers markets in Madison and Halifax have resulted in average revenue of \$100/batch. In addition to direct marketing, Virginia State Parks (DCR) conducted trial sales of Green Grillin’ charcoal through a State Park and has expressed interest in expanding this to other parks. “Virginia’s Finest” designation, a VDACS marketing program, is also being pursued.

4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

Increase in the number of acres directly impacted by new or improved land management practices.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	47000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Invasive exotic plants plague agricultural producers, land managers, and homeowners alike. An estimated \$26 to 35 billion annual in herbicide use and crop expenditures impact these groups. Many landowners are not aware of the presence of invasive plants on their own properties or the management implications. Natural resource professionals and citizen scientists have a basic awareness but lack knowledge and experience to effectively address and convey invasive species issues.

What has been done

Since 2007, the Northern District Natural Resources program, in collaboration with various public and private organizations, have delivered 37 educational events and 12 publications to raise awareness, increase knowledge, and initiate action against invasive exotic plants. These efforts target landowners, land care practitioners, and volunteers. The volunteer quotient was significantly increased this year through the training and program delivery of Master Naturalists.

Results

Over 2000 individuals have been engaged. On average, 68% plan to use practices they learned. Outreach marketing efforts have resulted in a significant increase in awareness of invasive species issues, evidenced by the creation and continuation of an annual statewide Invasive

Species Removal Day as well as volunteer initiated outreach programs reaching over 1400 people a year. Volunteer efforts have resulted in positive gains against various invasive species on hundreds of acres in the Northern District.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
124	Urban Forestry
131	Alternative Uses of Land
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
403	Waste Disposal, Recycling, and Reuse

Outcome #13

1. Outcome Measures

Number of projects assembling transcriptomes for vertebrates and invertebrates from the Southern Appalachian Mountains

Not Reporting on this Outcome Measure

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

External factors affect both the outcomes and ability to support educational programs. Virginia forestry has been impacted severely by the economic downturn in the past five years with numerous operations closing, reducing the demand for higher quality forest products. State budget reductions over the past several years have limited program expansion efforts. Natural disasters siphon off funds and create new issues related to natural resources and the environment. Virginia was impacted by a number of tornadoes

and an earthquake in 2011. Floods and droughts create unique problems for landowners and create additional needs for programming. Finally, new laws and regulations create new issues and opportunities.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluation of a broad array of programs, such as those represented by the Climate Change and Natural Resource planned program, require a multitude of varying procedures. In general, Extension educators are responsible for determining their evaluation procedures. For example, in 2011, the Virginia Forest Landowner education program undertook an evaluation covering the years 2006 to 2011. Fifteen participants responded via e-mail and 135 by regular mail, and all participants were asked a series of questions regarding income, acreage, and actions taken as a direct result of having attended one or more Virginia Forest Landowner Education and Central District Extension landowner programs. A five-year input survey from 2006 to 2011 on impacts realized from landowner participation in Extension Forestry programming bolstered a 47% response rate (135 out of 285) and revealed 60% of participants either obtained or updated a forest management plan for their property. Over \$580,000 was reported in timber income from both harvests and improvement thinnings. Twelve landowners indicated 206 acres involved small forest products enterprises to include ginseng, shiitake mushrooms, charcoal, and portable sawmill utilization, which combined generated over \$12,000 in reported income. Conservation efforts reported from our landowners indicated over 4,100 acres were enrolled into a conservation easement that allows sustainable timber management, and over 1,450 acres have instituted one or more forms of plant invasive species management, which leads to more timber and non-timber forest product growing space for landowners. Lastly, water quality best management practices were reported to have been conducted through riparian buffer tree plantings and seeding logging roads and deck areas on a total of 121 acres and 312 acres respectively.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Family Finance and Community Viability

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	10%	10%	10%	0%
603	Market Economics	5%	5%	10%	0%
604	Marketing and Distribution Practices	5%	5%	5%	0%
605	Natural Resource and Environmental Economics	5%	5%	15%	0%
607	Consumer Economics	20%	20%	15%	0%
608	Community Resource Planning and Development	20%	0%	15%	0%
610	Domestic Policy Analysis	5%	0%	5%	0%
801	Individual and Family Resource Management	25%	55%	15%	0%
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	5%	0%	10%	0%
	Total	100%	100%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	22.6	3.0	17.1	0.0
Actual Paid Professional	14.6	1.0	0.0	0.0
Actual Volunteer	2036.0	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
154183	188540	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
511110	161587	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1293868	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research and educational programs will be conducted to support the needs of Virginians and Virginia small business managers. Research in personal finance issues and evaluation of programming will be conducted to improve financial capability. Financial capability curriculum will be developed using proven delivery methods. Research will be conducted to develop knowledge of market systems. 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

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

3. How was eXtension used?

The Family Resource Management Specialist is the co-chair of the eXtension Financial Security for All Community of Practice. We refer to eXtension in our classes and publications were applicable and many of the county educators as well as the specialist participate in answering Ask-the-Expert questions. There is an Ask-the-Expert link on our publications page.

The Community Viability program holds a seat on the Land Use and Community Planning Community of Practice national leadership team, as the Southern Regional Representative. eXtension is referenced as a source for information in our classes and publications (where applicable) and Ask-the-Expert functionality is supported on our web pages. There is also an Ask-the-Expert link on our publications page.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	13778	36944	13052	56

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

Patent Applications Submitted

Year: 2011
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	2	8	10

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of education programs planned in public policy education

Year	Actual
2011	15

Output #2

Output Measure

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

Year	Actual
2011	7677

Output #3

Output Measure

- Number of educational programs conducted on creating home-based and micro businesses

Year	Actual
2011	6

Output #4

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
2011	37

Output #5

Output Measure

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

Year	Actual
2011	13799

Output #6

Output Measure

- Number of program participants improving their housing environment through new ownership, avoiding foreclosure or purchasing and maintaining a home.

Year	Actual
2011	304

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase the number of individuals completing basic financial management strategies including budgeting, setting financial goals, establishing a saving/investing program.
2	Increase the percentage of trained volunteers and citizens participating in Extension entrepreneurship workshops indicating increased entrepreneurial knowledge and skills applied to evaluation and planning of new enterprises (such as small businesses, micro-businesses, home-based businesses and agri-tourism).
3	Increase the percentage of communities and local governments partnering with Virginia Cooperative Extension faculty that seek and develop alternative economic development opportunities, and community planning goals.
4	Increase the number of individuals improving their housing environment by adopting techniques allowing them to purchase a home or to avoid foreclosure.
5	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.
6	Increase the number of local food entrepreneurs who make direct connections with local food distribution outlets such as grocery stores, colleges, universities, hospitals, schools, nursing homes etc.
7	The Virginia State University Rural Entrepreneurship and Business Development Program assists rural start-up businesses.
8	Family Financial Education for Virginia Families learn to increase savings

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	5374

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Financial capability empowers individuals to make informed choices, avoid pitfalls, know where to go for help, and take other actions to improve their present and long-term financial well-being. The well-being of Virginians depends on individual and family financial capacity. Evidence shows that education on financial topics is an important issue in Virginia. In 2010, VA the number of non-business bankruptcy filings 36,207, up 2% from 2009. One in every 9 Virginians lives at or below the poverty level.

What has been done

Fifteen county educators offered financial programming to adult audiences. Audiences included women, low and moderate income individuals and families, incarcerated individuals, and homeowners facing foreclosure. Individuals and families also received one-on-one counseling. Virginia Cooperative Extension collaborates with the Virginia Employment commission, Correctional facilities, the Department of Social Services, Habitat for Humanity, Virginia Department of Housing, Department of Human Services, Veterans Administration, Local Churches, Our House Families, Norfolk Redevelopment & Housing, STOP Organization, Caring Hearts Community Organization, public schools, colleges, universities, and local governments well as banks and credit unions.

Results

Eight financial management skills were evaluated: having written goals, having a written spending plan, comparing actual spending to their spending plan, having an emergency fund, planning saving to meet their goals, protecting against identity theft, reducing debt, and obtaining credit reports. Program results show that 70% of participants would change at least one financial habit

to improve their financial management. The average participant said they would improve three financial management skills. In one follow-up survey, 83% of the participants had actually changed one or more habits and over \$2800 had been saved. Another group had saved over \$5000. These results contribute to Virginia's families building financial capacity by making better financial choices, being better able to handle financial emergencies and thus reduce the need for these individuals and families to apply for public assistance.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to one source, there are more than 20-million micro-enterprises in the United States. Micro-enterprises and other small businesses are an important driver of the nation's economy. Providing entrepreneurship skills training to potential business owners ensures the capacity of the workforce to generate new jobs, and build the household wealth necessary to get ahead in a down economy.

What has been done

A series of programs were conducted such as "Idea Friendly Places", in urban and rural areas covering a wide diversity of topics on starting micro-enterprises. Programs included mentoring,

informational workshops, and webinars.

Results

As a result of Virginia Cooperative Extension's efforts, several business opportunities were highlighted. For example, a regional cooperative held a "shrimp boil" where area aquaculturists were able to show off their products to other farmers and the public. 1750 tickets were sold. Also, business plan writing skills and financial management skills training led to new businesses being created. In one program, out of 13 participants, one participant started a clothing alterations business and another started a home repair business. Examples like these demonstrate how to build entrepreneurs is important to individual households and to the nation.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Increase the percentage 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
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Two major pillars of community well-being are economic opportunity, and public policies that are supportive of entrepreneurial people. Where communities identify and plan to take advantage of emerging opportunities, their populations will have access to potentially high-paying and innovative business opportunities. Public education that prepares entrepreneurs and their community leaders aids community well-being.

What has been done

A series of workshops, farm tours, conferences, webinars, and other informal programs were held during 2011. These programs offered a variety of opportunities in alternative farm-based business opportunities, including farm-based energy production and conservation, farm-products for local markets, and agritourism. In addition, timely information about public policies and the foundations of community planning were communicated to local elected and appointed officials.

Results

As a result of the programs conducted in 2011, Virginia Cooperative Extension was able to raise awareness of opportunities to improve energy efficiency resulting in reduced production costs to farmers; train community champions to conduct a food system assessment and planning process; train local planning commissioners on how to develop land use plans that are supportive of farm-business.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Increase the number of individuals improving their housing environment by adopting techniques allowing them to purchase a home or to avoid foreclosure.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	304

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The well-being of Virginians depends on individual and family economic well-being including dealing with potential bankruptcy, credit debt, foreclosures, and mounting responsibilities for retirement/aging. In 2010, VA the number of non-business bankruptcy filings 36,207, up 2% from 2009. The December 2011 foreclosure rate in VA was 1 in every 1,193 households in Virginia received a foreclosure filing, with Fluvanna (1 in every 619), Prince William (1 in every 527), and Warren (1 in every 523) counties having the highest rates. Families need education on sound financial practices.

What has been done

Extension agents, volunteers, and the state specialist offered Foreclosure Prevention Counseling. In addition, volunteer staff in Prince William country and county agents in a few other counties offered classes to first time homebuyers. Healthy Homes classes were also offered.

Results

Eighty-three of the people receiving foreclosure counseling were able to stay in their homes. There are no statistics available about how many people actually purchased a home. Financial capability, as defined by the Financial Literacy and Education Commission, "is an individual's capacity, based on knowledge, skills, and access, to manage financial resources effectively. To develop this capacity, individuals must have appropriate access to and understanding of financial products, services, and concepts. Financial capability empowers individuals to make informed choices, avoid pitfalls, know where to go for help, and take other actions to improve their present and long-term financial well-being." All of the education and counseling efforts helped improve the financial capacity of the Virginians that participated. In order to offer these sessions, in addition to paid staff, 67 volunteers put in 1127 hours for a salary savings of \$24,828 at the rate of \$22.03 per hour.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #5

1. Outcome Measures

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	13799

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The down turn in economic markets, financial issues are on everyone minds. On March 26, 2005, the Virginia General Assembly Code of Virginia Section 22.1-200.03B directing the Virginia Board of Education to "establish objectives for economic education and financial literacy". In 2009 the Department of Education required a class for graduation. In 2010, the Financial Literacy and Education Commission (FLEC) issued "Promoting Financial Success in the United States: National Strategy for Financial Literacy 2011".

What has been done

In 2011, over 38 FCS and 4-H agents and 1,862 volunteers used several programs for increasing the financial capacity of Virginia's youth: Reality Store, the National Endowment for Financial Education (NEFE) High School Financial Planning Program (HSFPP), Kids' Marketplace, and Camp Millionaire. While Reality Store is main program offered, the demand for Kid's Marketplace is growing. In 2011 over 14,000 student guides for the NEFE High School Financial Planning Program were ordered in Virginia. It was reported that volunteers provided 8,761 hours or the equivalent of \$193,005 (volunteer rate \$22.03) in salary saving had VCE been required to pay for these services.

Results

Follow-up data from Reality Store shows that the youth's financial capacity has improved. Evaluations from 2-3 months after the event indicate that students are creating spending plans, not buying everything they want, saving money, paying cash for what they purchase, shopping smarter, and making better choices based on their experience with Reality Store. They indicate that they have shared what they learned with brothers and sisters, parents, and friends. Some of the things they shared were that it was expensive having children, that it is important to save, that it hard to make decisions, that things are expensive, and that the higher the education you have, the better the job you will get. Even though this is from 2012 the following article is in Reality Store <http://www.martinsvillebulletin.com/article.cfm?ID=32054&back=archives>.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Increase the number of local food entrepreneurs who make direct connections with local food distribution outlets such as grocery stores, colleges, universities, hospitals, schools, nursing homes etc.

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

The Virginia State University Rural Entrepreneurship and Business Development Program assists rural start-up businesses.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Many businesses and individuals wanting to develop businesses in rural areas of Virginia lack the technical assistance and broadband capabilities they might need to start or expand a small business.

What has been done

The USDA Rural Business Development Program provides funds for 1890 Land Grant institutions to provide this technical assistance. With a grant from USDA, Virginia State University provided 20 seminars with an average of six participants in five counties in Southeast Virginia. These seminars included information on what is needed to start a business in Virginia, how to write a business plan, business structures, and loan Resources that may be available in their areas. These resources were not normally available or they did not have access to these resources in their areas. The Virginia State University Mobile Computer Laboratory was used to provide some broadband capability to areas that lacked that capability. The lab traveled to certain areas and allowed program participants to download copies of business plans they were interested in. The lab was also used as a meeting place (It has 13 computer stations) in communities without these resources.

Results

One-on-one technical assistance was provided to 20 individuals beyond the basic seminars.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #8

1. Outcome Measures

Family Financial Education for Virginia Families learn to increase savings

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Many Virginia families face financial hardships - with approximately one-quarter of these families earning less than the amount needed to pay for basic necessities. In the present economic situation, it becomes even more important for families to be able to make decisions that will allow them to use their resources effectively.

What has been done

Ten seminars were held on the following topics: Paying off Debt, Preparing Family Financial Goals, Developing Household Budgets, and Curbing Impulse Spending, Ways to Save During Challenging Economic Times, and Saving Money When Shopping for Food.

Results

Approximately 600 individuals from campus, community churches, student organizations, senior centers, and other civic organizations attended these programs. All of the individuals attending the seminars on developing household budgets and household financial goals developed these during the seminar and said that they would use these for at least six months. These instruments should assist these households in getting a handle on their finances (knowing how much money they have to spend, what they owe, and how they will pay what they owe). It should also help them make better purchasing decisions and curb impulse spending. Program participants were shown ways we spend money and identified ways they could save money (for example, less gourmet coffee) and save some of that money. Participants also shared with the groups how they saved money. Participants attending the couponing workshop returned receipts indicating they saved an average of \$20 at one purchase.

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

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

Brief Explanation

Several factors affected the generation of 2011 outcomes. Among them, included:

- 1) a major hurricane hit the east coast of the US
- 2) this was an election year in Virginia
- 3) job uncertainty, slow housing market, high unemployment each played a role, among other forces
- 4) shrinking public budgets played a role in program funding and workshop attendance

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Both youth and adults reached by VCE personal finance programing made behavior changes in their financial management skills which will increase their financial capacity over time. In 2011 a survey system was implemented to collected data and the results are reported in the individual outcomes. As more agents use the instruments, it is hoped that our follow-up data will improve along with the reporting of the number of volunteers and the number of hours they commit to our programs.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Families and Communities

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
608	Community Resource Planning and Development	10%	10%	10%	10%
802	Human Development and Family Well-Being	90%	90%	90%	90%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	19.5	2.5	17.2	0.0
Actual Paid Professional	13.3	1.0	14.3	0.0
Actual Volunteer	1086.0	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
140621	272386	269166	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
466154	120868	775345	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1180061	0	3123122	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Activities include entrepreneurial education, asset-based economic development, leadership, civic engagement, child care provider education, parent 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

Parents, grandparents, child care providers and early childhood educators, providers of after-school care, community organizations, community partners, community leaders and government officials, donors, K-12 educators, and volunteers.

3. How was eXtension used?

eXtension was used in this program in several ways. First, eXtension was used as a location for gathering information to be used by agents in local trainings in parenting, child care, and caregiving. Secondly, eXtension was used as a networking source to find experts across the country in various topics related to caregiving and parenting. Finally, eXtension was shared with some program participants as a source of information, including having parents sign up for the Just in Time Parenting newsletters.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	17329	25924	4890	276

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	2	6	8

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2011	433

Output #2

Output Measure

- Number of fact sheets, publications and curricula on families and communities.

Year	Actual
2011	174

Output #3

Output Measure

- Number of citizens receiving entrepreneurial education.
Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Number of adults engaged in community-based leadership development education.

Year	Actual
2011	132

Output #5

Output Measure

- Number of communities partnering with Virginia Cooperative Extension faculty to address emerging issues (i.e. land use, agritourism, local foods, bioenergy, youth gangs, and others).

Year	Actual
2011	70

Output #6

Output Measure

- Number of workshops, activities, or programs offered to address emerging issues.

Year	Actual
2011	64

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Parenting Education - Increase percentage of parenting education participants that indicate increased knowledge of effective parenting practices, such as nurturing and guiding children, understanding basic child development, reducing family conflict and managing stress, and knowing how to access available community resources to meet family needs.
2	Parenting Education - Increase percentage of parenting education participants that adopt developmentally appropriate, effective parenting practices, such as nurturing and guiding children, and actively seeking to manage stress and reduce family conflicts.
3	Parenting Education - Increase percentage of parenting education participants that use community resources more frequently to meet family needs regarding housing, food, health/mental health issues, employment, legal concerns, educational needs, etc.
4	Child Care Provider/Early Childhood Training - Increase percentage of early childhood professional development participants that indicate increased knowledge of core competency areas, such as basic child development, appropriate child observation and assessment, effective interaction strategies, and effective learning environments.
5	Child Care Provider/Early Childhood Training - Increase percentage of early childhood professional development participants that improve their early childhood learning environment by making practice changes, such as implementing developmentally-appropriate learning practices, interaction practices and observation assessment strategies.
6	Child Care Provider/Early Childhood Training - Increase percentage of early childhood professional development participants that improve program management practices, such as effective relationships with enrolled families, record keeping, facilities management, budgeting, and emergency preparedness.
7	Facilitation Skills Training - Increase percentage of trained volunteers and citizens participating in facilitation skills training that indicate increased knowledge and skills as a result of participation.
8	Leadership Development Education - Increase percentage of adult citizens participating in leadership development education programs that indicate increased knowledge and skills as a result of participation.
9	Food-Based Business Workshops - Increase the percentage of trained volunteers and citizens participating in food-based business workshops that indicate increased understanding/knowledge of food-based businesses as a result of participation.
10	Increase percentage of early childhood educators providing outdoor learning experiences for young children.
11	Increased number of community residents equipped to lead civic engagement efforts aimed at addressing poverty issues.

Outcome #1

1. Outcome Measures

Parenting Education - Increase percentage of parenting education participants that indicate increased knowledge of effective parenting practices, such as nurturing and guiding children, understanding basic child development, reducing family conflict and managing stress, and knowing how to access available community resources to meet family needs.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	97

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2011, 31 children died from physical neglect, 23 children died as victims of physical abuse and nine children died due to medical neglect, shaking injuries, and lack of supervision. Research shows that parents who lack understanding of their children's developmental stages, who hold unreasonable expectations for their child's abilities, or who are unaware of effective discipline strategies, may be abusive or neglectful. Concerns about how Virginia families are functioning have economic impacts for the individual family unit and the Commonwealth.

What has been done

VCE agents partnered with the local Departments of Social Services and other agencies. Educational programming focused on effective parenting techniques, communication and positive discipline in parenting workshops for various audiences including DSS referred or court ordered parents, Head Start parents, parents of teens involved with the juvenile justice system, parents of newborns, incarcerated parents, grandparents and other relatives raising children, stay at home parents, homeless parents and parents in transitional housing, and others.

Results

More than 500 parents participated in VCE parenting education programs in 2011. The result of pre and post tests revealed:

97 percent of parents increased knowledge in understanding child development

98 percent of parents increased knowledge of effective parenting practices

97 percent of parents increased knowledge in nurturing children

97 percent of parents increased knowledge in guiding children

Another evaluation question revealed that evaluations that indicated that 91 percent of parents

agreed or strongly agreed that they had a better understanding of how to build relationships with their family, neighborhood and community groups as a result of their participation in our classes.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Parenting Education - Increase percentage of parenting education participants that adopt developmentally appropriate, effective parenting practices, such as nurturing and guiding children, and actively seeking to manage stress and reduce family conflicts.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	94

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2011, 31 children died from physical neglect, 23 children died as victims of physical abuse and nine children died due to medical neglect, shaking injuries, and lack of supervision. Research shows that parents who lack understanding of their children's developmental stages, who hold unreasonable expectations for their child's abilities, or who are unaware of effective discipline strategies, may be abusive or neglectful. Concerns about how Virginia families are functioning have economic impacts for the individual family unit and the Commonwealth.

What has been done

VCE agents partnered with the local Departments of Social Services and other agencies. Educational programming focused on effective parenting techniques, communication and positive discipline in parenting workshops for various audiences including DSS referred or court ordered parents, Head Start parents, parents of teens involved with the juvenile justice system, parents of newborns, incarcerated parents, grandparents and other relatives raising children, stay at home parents, homeless parents and parents in transitional housing, and others.

Results

More than 500 parents participated in VCE parent education programs. The result of pre and post tests revealed:

97 percent of parents reported that they had adopted practices in guiding children

94 percent of parents reported that they had adopted practices to reduce family conflict and manage stress

In one county where 363 parents attended parenting education classes, there were no DSS referred clients that had a new founded case of abuse or neglect. Moreover, no DSS referred families had their children placed in foster care upon completion of the parenting classes. These results were taken 12-24 months upon program completion.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Parenting Education - Increase percentage of parenting education participants that use community resources more frequently to meet family needs regarding housing, food, health/mental health issues, employment, legal concerns, educational needs, etc.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2011, 31 children died from physical neglect, 23 children died as victims of physical abuse and nine children died due to medical neglect, shaking injuries, and lack of supervision. Research shows that parents who lack understanding of their children's developmental stages, who hold unreasonable expectations for their child's abilities, or who are unaware of effective discipline strategies, may be abusive or neglectful. Concerns about how Virginia families are functioning have economic impacts for the individual family unit and the Commonwealth.

What has been done

VCE agents partnered with the local Departments of Social Services and other agencies. Educational programming focused on effective parenting techniques, communication and positive discipline in parenting workshops for various audiences including DSS referred or court ordered parents, Head Start parents, parents of teens involved with the juvenile justice system, parents of newborns, incarcerated parents, grandparents and other relatives raising children, stay at home parents, homeless parents and parents in transitional housing, and others.

Results

More than 500 parents participated in VCE parent education programs. The result of pre and post tests revealed:

70 percent of parent reported using community resources to meet their needs.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	95

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Currently, 1 in 5 Virginia children enter Kindergarten without the basic skills needed to succeed. And research shows that the first five years of life are crucial to children's long term cognitive, social and emotional development. Additionally, every dollar invested in high quality care and early childhood education returns \$7 to \$8 to society by reducing cost related to crime, special education and welfare and increasing revenues through improved employee productivity.

What has been done

To address the need for high quality childcare, and build upon the connection between training and quality care, workshops and conferences were held across the state for family home and center providers/early childhood educators on a host of topics aimed at improving the quality of care provided to the children they serve.

Results

Results of pre and post tests revealed:

- 90%- gained effective discipline techniques to use in their center
- 100%- learned more about the importance of physical activity for young children
- 92%- will use a new physical activity in their setting
- 99%- plan to use music to stimulate creative youth activities
- 96%- learned a new art activity that emphasizes youth exploration and process
- 96%- learned new conflict resolution techniques
- 98%- learned new strategies for creating relationships and connections with children

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Child Care Provider/Early Childhood Training - Increase percentage of early childhood professional development participants that improve their early childhood learning environment by making practice changes, such as implementing developmentally-appropriate learning practices, interaction practices and observation assessment strategies.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Currently, 1 in 5 Virginia children enter Kindergarten without the basic skills needed to succeed. And research shows that the first five years of life are crucial to children's long term cognitive, social and emotional development. Additionally, every dollar invested in high quality care and early childhood education returns \$7 to \$8 to society by reducing cost related to crime, special education and welfare and increasing revenues through improved employee productivity.

What has been done

To address the need for high quality childcare, and build upon the connection between training and quality care, workshops and conferences were held across the state for family home and center providers/early childhood educators on a host of topics aimed at improving the quality of care provided to the children they serve.

Results

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Child Care Provider/Early Childhood Training - Increase percentage of early childhood professional development participants that improve program management practices, such as effective relationships with enrolled families, record keeping, facilities management, budgeting, and emergency preparedness.

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Facilitation Skills Training - Increase percentage of trained volunteers and citizens participating in facilitation skills training that indicate increased 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
2011	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia Cooperative Extension agents and community leaders have indicated a lack of knowledge and experience in effectively managing and facilitating meetings and community discussions as reported by local Extension offices and Extension Leadership Councils. The 2009/2010 strategic planning listening sessions indicated community leaders needed assistance in creating change through individual and community leadership development, facilitation, and conflict resolution skills development.

What has been done

CV researched and selected a curriculum for enhancing facilitation skills developed by the University of Maine. Strengthening Your Facilitation Skills (SYFS) 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

Extension has become a resource for public and private organizations when facilitators are needed. During 2011, 16 community participants completed the 15 hour training. Since 2008, 64 Extension educators have completed the training. From this group, 26 are certified as Master Trainers, 23 use the skills in their Extension work, and 15 educators have left Extension's employment.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #8

1. Outcome Measures

Leadership Development Education - Increase percentage of adult citizens participating in leadership development education programs that indicate increased 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
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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The 1986 Shadows in the Sunbelt report challenged rural regions to reinvent their economies by developing a new generation of civic leaders. The 2002 State of South report stated leadership development is needed at the grassroots and elected levels. And the Southern Rural Development Initiative executive director was adamant that communities cannot wait for exceptional leaders to appear but must "help ordinary people become leaders." Further, the Shenandoah Valley Partnership CEO said "in some rural communities growth is slowed down by leadership."

What has been done

Virginia Cooperative Extension's leadership development curriculum, Innovative Leadership: Building Community Connections, is a key training tool for developing the leadership skills of community residents. The program is an 18-hour, 6 training module curriculum enabling individuals to build their leadership skills; increase their awareness of community issues; network with other leaders; and become more engaged in community, civic, and governmental activities.

Results

In 2011, 14 trainers taught adult leadership classes in 5 counties, with 58 of 68 registered residents completing the training. Graduates were engaged in community-based projects relating to quality of life, learning-readiness, and economic development. Several graduates credited Innovative Leadership with equipping them to run for the local school board, starting a non-profit agency focused on local foods/urban gardening, and partnering their non-profit with another to jointly receiving significant funding. One of the Brunswick graduates continues to be in conversation with local elected officials regarding downtown renewal and increasing the number of retail stores in the town. Roanoke City validated the value of leadership development by including funding in its Community Development budget to offer Innovative Leadership in 2012.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #9

1. Outcome Measures

Food-Based Business Workshops - Increase the percentage of trained volunteers and citizens participating in food-based business workshops that indicate increased understanding/knowledge of food-based businesses as a result of participation.

Not Reporting on this Outcome Measure

Outcome #10

1. Outcome Measures

Increase percentage of early childhood educators providing outdoor learning experiences for young children.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Studies show that children are increasingly disconnected from nature. Children spend fewer hours outside exploring nature and being physically active. Research links lack of exposure to nature to increases in childhood obesity, attention disorders, and depression. Additionally, time spent outside both at home and at school contributes positively to children's cognitive development and physical fitness. In fact, time spent outdoors is the strongest correlative with increased physical fitness and activity in children.

What has been done

In 2011, two 6-hour Environmental Experiences for Early Childhood Project Learning Tree trainings were conducted for a total of 32 participants from family day homes, childcare facilities, public school pre-K, and Head Start sites from Amherst, Lynchburg, Nelson, Campbell, Bedford and Halifax attended at least one of the trainings. These participants provide care to approximately 420 children.

Results

Participants reported the following knowledge gains:

100%/32 learned about the best practices for taking young children outside to explore nature

100%/32 learned new ideas for how to incorporate environmental education into educational experiences including music and art

Follow up evaluations were conducted and as a result of the training:

100% had use activities from the training to help children learn about the environment

100% had incorporated more natural items into their learning environment

100% had increased the amount of time children spend outside learning about nature

4. Associated Knowledge Areas

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

Outcome #11

1. Outcome Measures

Increased number of community residents equipped to lead civic engagement efforts aimed at addressing poverty issues.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	7

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Greenville/Emporia, 26 percent of children live in poverty. Research indicates that there are unique stressors that impact low-income families, including concerns related health, housing, food security, employment, crime, etc. Thus, there is a need to address the unique challenges that arise when communities have a disproportionate share of the population living in poverty or with very low incomes.

What has been done

In 2010, Turning the Tide on Poverty was implemented in order to seek a wide range of community members to identify a "place-based" solution to poverty grounded in local talents and concerns, and led by local voices. Beginning with a five-week Study Circles process, community members engaged in thoughtful discussion and exploration before finalizing a community action plan. Local citizen volunteers were trained as facilitators to lead the Study Circles discussions.

Results

The project began with a poverty simulation where 40 participants were invited to participate in the discussion circles. Seven local citizens received 8 hours of facilitation training. The trained facilitators, with support from the Extension team, led five guided discussions with local citizens. At the culmination of the discussions, an action forum was held with additional community members. An action plan was formed to begin efforts aimed at addressing poverty-related concerns in the community. The action teams were formed to address: greater opportunities for youth through informal education and arts; greater workforce and economic development opportunities; and community pride and beautification. Early results include getting a mobile food pantry to Emporia and co-hosting a workforce training for laid-off employees.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

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

In 2011, there were five specialists in community viability that provided leadership for the facilitation and leadership education programming. Family and Consumer Sciences agents in Virginia hosted the parenting education and child care provider trainings. The number of FCS agents remained low and limited the amount of programming in family and human development. Moreover, two of the agents that provided leadership for major child care provider trainings left their positions in 2011. Thus, those programs did not occur as they had in recent years. There is also an expressed need for specialists support for agent work in parenting education and child care provider training. At present, there are FCS agent positions being advertised and hired in order to address some of those gaps.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Parenting education: Prince William County agencies rely on VCE to provide parent education to their clients. The 2012 Strategic Plan Objectives identify issues related to reduction of abuse and neglect and at risk youth. PWC VCE Parent Education programs address those two issues. PWC VCE staff and volunteers provided 31 STEP parenting classes; 11 Juvenile Justice Parenting Programs; and 10 When Families Get Angry classes. Staff also offered monthly parenting presentations at three homeless shelters.

Retrospective pre/post tests revealed the following changes:

Knowledge outcomes

97 %/ 287 of parents increased knowledge in understanding child development

98 %/ 363 of parents increased knowledge of effective parenting practices

97 %/ 363 of parents increased knowledge in nurturing children

97 %/ 363 of parents increased knowledge in guiding children

Practice outcomes

97 %/ 363 of parents of adopting practices in guiding children

96 %/ 188 of parents adopting practices to reduce family conflict and manage stress

Of the participants who completed one of the programs 12 to 23 months prior:

- No DSS referred clients had a new founded case of abuse or neglect;
- No DSS referred families had their children placed in foster care; and

- Only 26% of the youth whose parents completed the JJPP class, acquired a new court charge, which is lower than those who had not attended the class.

Child care provider training: As a result of attending VCE programs in Amherst County and surrounding area, participants reported the following knowledge gains: (Percentages based on number completing program evaluations for each separate workshop.)

- 100%/27 about food labeling regulations related to food allergens
- 100% /27new ideas for how to plan menus using allergen free foods
- 100% /27how to keep food safe during storage and preparation
- 100%/27 about the factors that contribute to bacterial growth in food
- 100%/26 about the components of effective and high-performing teams
- 100%/26 about the characteristics that contribute to effective teams
- 00%/26 gained new ideas for how they can enhance teamwork among staff at their site
- 100%/19 about how adult interactions either encourage or discourage children's exploration of nature
- 100%/19 about best practices for taking young children outside
- 100%/19 about how to incorporate environmental concepts into other educational activities including music and art
- 100%/19 new ideas for how to incorporate natural items into their educational setting
- 100%/19 gained confidence in their ability to help young children learn about and explore nature
- Based on follow-up evaluations
- 100% had used new hand washing materials
- 88% had used new food safety educational materials with other staff and/or parents
- 75% had created new food labels for food containers
- 91% had improved listening and communication skills to facilitate teamwork
- 91% had learned more about individual staff members to help motivate them to be more team-oriented
- 100% had used activities from the training to help children learn about the environment
- 100% had incorporated more natural items into their learning environment
- 100% had increased the amount of time children spend outside learning about nature

Key Items of Evaluation

Parenting education: Prince William County agencies rely on VCE to provide parent education to their clients. The 2012 Strategic Plan Objectives identify issues related to reduction of abuse and neglect and at risk youth. PWC VCE Parent Education programs address those two issues. PWC VCE staff and volunteers provided 31 STEP parenting classes; 11 Juvenile Justice Parenting Programs; and 10 When Families Get Angry classes. Staff also offered monthly parenting presentations at three homeless shelters.

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- 97 %/ 363 of parents increased knowledge in nurturing children
- 97 %/ 363 of parents increased knowledge in guiding children

Practice outcomes

- 97 %/ 363 of parents of adopting practices in guiding children
- 96 %/ 188 of parents adopting practices to reduce family conflict and manage stress

Of the participants who completed one of the programs 12 to 23 months prior:

- No DSS referred clients had a new founded case of abuse or neglect;
- No DSS referred families had their children placed in foster care; and
- Only 26% of the youth whose parents completed the JJPP class, acquired a new court charge, which is lower than those who had not attended the class.

Child care provider training: As a result of attending VCE programs in Amherst County and surrounding area, participants reported the following knowledge gains: (Percentages based on number completing program evaluations for each separate workshop.)

100%/27 about food labeling regulations related to food allergens

100% /27new ideas for how to plan menus using allergen free foods

100% /27how to keep food safe during storage and preparation

100%/27 about the factors that contribute to bacterial growth in food

100%/26 about the components of effective and high-performing teams

100%/26 about the characteristics that contribute to effective teams

00%/26 gained new ideas for how they can enhance teamwork among staff at their site

100%/19 about how adult interactions either encourage or discourage children's exploration of nature

100%/19 about best practices for taking young children outside

100%/19 about how to incorporate environmental concepts into other educational activities

including music and art

100%/19 new ideas for how to incorporate natural items into their educational setting

100%/19 gained confidence in their ability to help young children learn about and explore nature

Based on follow-up evaluations

100% had used new hand washing materials

88% had used new food safety educational materials with other staff and/or parents

75% had created new food labels for food containers

91% had improved listening and communication skills to facilitate teamwork

91% had learned more about individual staff members to help motivate them to be more team-oriented

100% had used activities from the training to help children learn about the environment

100% had incorporated more natural items into their learning environment

100% had increased the amount of time children spend outside learning about nature

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Food, Nutrition, and Health

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
702	Requirements and Function of Nutrients and Other Food Components	15%	0%	30%	100%
703	Nutrition Education and Behavior	40%	60%	35%	0%
721	Insects and Other Pests Affecting Humans	5%	5%	5%	0%
724	Healthy Lifestyle	40%	35%	30%	0%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	2.5	0.0	0.0
Actual Paid Professional	12.8	1.0	13.8	2.0
Actual Volunteer	1025.0	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
135223	187200	258833	336855
1862 Matching	1890 Matching	1862 Matching	1890 Matching
448258	96592	745580	369951
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1134759	0	3003226	59847

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

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

2. Brief description of the target audience

Food, nutrition, and health - Young adults (ages 18 to 59), older adults (age 60 and older), caregivers of older adults, adults with type 2 diabetes, parents and caregivers of individuals with type 2 diabetes, senior center and meal site staff and volunteers, and Extension educators.

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

3. How was eXtension used?

Individual agents and specialists are signed up to take questions as experts through the Ask-an-Expert system in the area of Food, Nutrition and Health.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	15617	169298	6678	1093

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	3	20	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of adults participating in diabetes educational programs.

Year	Actual
2011	391

Output #2

Output Measure

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

Year	Actual
2011	307481

Output #3

Output Measure

- Number of research projects completed or in progress on adult obesity and related chronic disease.

Year	Actual
2011	23

Output #4

Output Measure

- Number of research papers published on adult obesity and related chronic disease.

Year	Actual
2011	71

Output #5

Output Measure

- Number of Master Food/Health volunteers trained to extend the work of an Extension educator.
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Number of workshops/trainings conducted to prevent and treat vector-borne disease and public health pests.

Year	Actual
2011	4

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase in the number of individuals with diabetes who have improved their Hemoglobin A1c level, meal planning behaviors or physical activity behaviors, three months after participating in a Diabetes Education programs offered in collaboration with a local health care provider.
2	Increase in number of adults that make lifestyle changes which improve their dietary quality and/or physical activity level after participation in VCE programs.
3	Number of discoveries from completed obesity related research projects which focus on examining adult obesity from its root causes to its association with chronic disease.
4	Number of projects manipulating genomes of insects vectoring diseases to humans
5	Value-adding Properties of Grape (<i>Vitis vinefera</i>) and Stinging Nettle (<i>Urtica dioica</i>) for in vitro Antiproliferation of Colon Cancer Cells

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	219

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

About 466,800 Virginians have been diagnosed with diabetes and another 233,441 have diabetes and don't know it. Diabetes is the 6th leading cause of death in Virginia and adds to deaths from heart disease and stroke. Diabetes complications exert a high cost in money, loss of productivity, and quality of life. In Virginia diabetes leads to 11,700 hospitalizations each year, adding nearly \$173 million to our health care bill. The burden of diabetes is disproportionate to African Americans, the elderly, and persons with limited incomes or living in underserved areas.

What has been done

Family and Consumer Sciences partnered with the Dept of Population Health Sciences and the Center for Research in Health Behavior at Virginia Tech, the Virginia Diabetes Council, and other health professionals to offer Balanced Living with Diabetes (BLD). BLD provides education to help people with type 2 diabetes and their families learn about self-care, food choices to control carbohydrate intake, and life style patterns that prevent or slow the complications of their disease. BLD includes 4 weekly classes and a reunion class 3 months following for reassessment. Grants from NIH and the Obici Healthcare Foundation provided funding. Programs target African Americans and where possible, are offered in faith-based settings. A total of 13 programs were offered in 10 locations: Chesterfield (2), Emporia, Isle of Wight, Petersburg (2), Richmond (2), Roanoke, Southampton, Suffolk, Surry, and Sussex. (Six programs have not completed their final assessments and outcome data will be reported at a later time.)

Results

This year 391 Virginians were reached with BLD; 68% were African American and over half were above age 60. Among those reporting income, 42% had annual incomes of \$30,000 or less and

one fourth had annual incomes of \$20,00 or less. Upon program completion over 90% of participants were aware of the need to have regular hemoglobin A1c tests, eye exams, foot exams, and flu shots.

Use of a meal planning method to control carbohydrate intake is emphasized in the BLD curriculum. When the program began only 16% of class members reported using a meal planning method on 6 to 7 days of the week prior, and 64% never used a meal planning method. At the 3-month reunion, 40% of those returning used a meal planning method on 6 to 7 days of the week prior and another 32% used a meal planning method on 3 to 5 days.

Physical activity helps lower blood sugar and participants are given a step counter for walking and encouraged to gradually increase their activity to 30 minutes on most days, if physician approved. Initially, over one third of responders had 2 or fewer days with 30 minutes of physical activity in the week prior and only 10% had 30 minutes of physical activity on 6 to 7 days. At the reunion 27% had completed at least 30 minutes of physical activity on 6 to 7 days in the week prior and another 53% completed 30 minutes on 3 to 5 days.

Hemoglobin A1c indicates average blood sugar levels over the 3 months prior and evaluates diabetes management. A1c was measured at the 1st class and the reunion and participants were helped to understand the importance of this test. Of the 80 participants who were reassessed, 56% had appropriate A1c levels at the first class and maintained those levels over the 3-month interval; 40% decreased their A1c by 0.5% or more; and nearly half of those decreased their A1c by 1.0% or more. The Journal of the American Medical Association reported that people who decrease their A1c by even 0.5% may require fewer physician visits in the years following and could save at least \$685 per year in health care costs. According to the CDC a 1.0% drop in A1c is associated with a 40% decrease in risk of diabetes complications including blindness, amputations, and kidney failure. Preventing kidney failure and dialysis in even one person saves at least \$72,000 per year in health care costs.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	278596

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Combined, physical inactivity and unhealthy eating are second only to tobacco use as the primary cause of death in the United States. Conversely, regular physical activity and healthy eating habits improve quality of life, prevent chronic diseases such as diabetes, hypertension, and cancer, and reduce health care costs for both the individual and society. Unfortunately, in Virginia, nearly 75% of adults do not meet the current public health recommendations for physical activity. Similarly, over 70% of adults are not meeting the current dietary guidelines for fruits and vegetables.

What has been done

Good nutrition and physical activity are central in preventing chronic diseases, such as obesity and diabetes, and saving healthcare costs. VCE offers education on a wide variety of food, nutrition, health, and chronic disease topics for individuals to reduce the number of visits to doctors and other healthcare providers, fewer costly laboratory tests, and lower numbers of hospital visits for unmanaged diabetes for uninsured individuals.

Results

One of the adult VCE programs includes the FIT Extension program. Just over 700 adults participated in 2011. Due to the research and extension partnership on the program, we have been able to conduct a rigorous evaluation each year collecting baseline and follow-up data on over 75% of all participants. All information provided here uses an intention to treat approach whereby all participants are included in the data. Participants who did not complete the follow-up are considered unsuccessful in changing behavior with this approach. In 2011 respectively, before the program began 40 percent of the participants were eating the recommended number of servings of fruits and vegetables. By the end of the program, the percentage increased to 62%. The program was also successful at increasing the proportion of participants that increased their physical activity. Before the program began, approximately 25% of the participants were not engaging in any physical activity, 40% doing some activity but not meeting the recommended guidelines, and 35% were meeting the guidelines. By the completion of the program these numbers shifted significantly to 13 (inactive), 43 (some activity), and 44 (meeting guidelines) percent.

VCE educators trained an additional 1,000 volunteers, who contributed over 9,256 hours of time to the delivery of programs.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	23

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Recent data indicate 17% of children and adolescents are obese and more than 30% of adults. Excess body fat increases the risk of hypertension, cardiovascular disease, and diabetes, major contributors to health care costs, loss of productivity, early mortality, and diminished quality of life. Obesity-related illnesses place a significant burden on the economy and obesity is believed to account for as much as 9 percent of total health care expenditures and a minimum of \$26.8 billion in medical spending.

What has been done

The etiology of obesity extends beyond energy imbalance to include genomic, molecular, cellular, and organ components that interact with individual preferences, family and community, work life, economics, and public policy. Virginia Tech scientists are striving to examine obesity from bench to behavior through inter-disciplinary and translational science and applications that will result in positive public health impacts.

Results

In 2011, 71 peer-reviewed articles (in childhood obesity and food, nutrition, and health) were published or in press. Current research studies aim to explore a multitude of factors and interventions related to obesity, health, and well-being, including: a surveillance assessment of health status and the built environment in a health disparate region; hypothalamic control of body

weight; the influence of economic decisions on genetics using mice and an operant behavior chamber to set food prices; the effect of resistance training as an approach to prevent diabetes from developing among older, overweight individuals with pre-diabetes; the identification and characterization of phytochemicals from food sources or medicinal herbs that provide beneficial effects on cardio-vascular disease, diabetes, and cancer; the effect of DHA supplements on muscle damage and inflammation; the impact of lifestyle and pharmacological therapies, both alone and in combination, to alter the course of the cardiovascular and metabolic consequences that occur with aging and obesity; value-added properties of grape and stinging nettle for the antiproliferation of colon cancer cells; and the initiation of a community-based participatory research framework for a health disparate region.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Number of projects manipulating genomes of insects vectoring diseases to humans

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	7

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The common bed bug is rapidly increasing its economic significance as a structural pest in Virginia and throughout the United States. The number of reported infestations in single family homes, hotel rooms, and multi-unit housing has increased 10-100 fold every year since 1990. Although the exact economic consequences of the U.S. bed bug resurgence are still unknown, they are thought to be considerable. So far the economic impacts resulting from bed bug infestations include not only the cost of professional pest control service, but the loss of revenue from hotels and apartments that cannot be rented, replacement of infested furniture, occupant medical bills, bad publicity and reputation damage for the hospitality industry, and thousands of

lawsuits naming hotels and housing authorities as the defendants. Feiden (2007) reports that at the end of the fiscal year in 2006, 6,889 bed bug infestation complaints were recorded by the New York City Department of Housing, Preservation and Development (HDP), and 2,008 building owners were presented with summonses. Bed bug lawsuits have resulted in millions of dollars being spent to settle litigation settlements over the last several years.

As a group arboviral diseases are the cause of unacceptable levels of morbidity and mortality in humans and domesticated animals, and as such are a tremendous economic and health burden.

More than one million human lives are lost each year from malaria, dengue, yellow fever, and other infectious diseases transmitted by mosquitoes. Because of growing insecticide resistance, climate change, increased air transportation, and the ability of mosquitoes to quickly adapt to new habitats, the public-health burden of vector-borne diseases is increasing and expanding globally. This recent change in a global situation represents a threat to public health and welfare of the Commonwealth of Virginia.

What has been done

A series of studies are being conducted to elucidate the mechanisms and potential solutions of vector-borne diseases, including: examining genetic differences between pyrethroid-sensitive and resistant strains of bed bugs using next-generation high-throughput sequencing; identifying novel promoter sequences capable of driving gene expression, improving mosquito transposition rates, improving gene knockdown strategies and improving site-specific recombination rates; and studying how arboviruses establish and maintain persistent infections in mosquitoes. Several programs have also been implemented to adopt pest management strategies at schools and other public facilities.

Results

Advancements are being in the laboratory setting to identify strategies to address concerns arising from insects and pests, and resulting vector-borne diseases. Additionally, educational workshops and materials have been developed to translate these findings to public health officials.

4. Associated Knowledge Areas

KA Code	Knowledge Area
721	Insects and Other Pests Affecting Humans

Outcome #5

1. Outcome Measures

Value-adding Properties of Grape (*Vitis vinefera*) and Stinging Nettle (*Urtica dioica*) for in vitro Antiproliferation of Colon Cancer Cells

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Over 7 million tons of grapes were harvested in the U.S. in 2009, and more than 60% were used to make wine or juice. Grape pomace is the main byproduct of wine and juice production and is primarily composed of skin, seed, pericarp, and stem. Stinging nettle is a broad-leaf plant regarded as a weed. Researchers at VSU are investigating the extracts of grape pomace and stinging nettle for antiproliferation of colon cancer cells in vitro. In 2011, the American Cancer Society stated that colon cancer was the second leading cause of cancer related deaths in the United States at 49,380 ? behind lung cancer at 156,940 deaths.

What has been done

Research was conducted at Virginia State University to determine the effect of grape pomace and stinging nettle extracts for their anti-proliferation effects on colon cancer (HT-29 and Caco-2 colon cells). The goal is to identify compounds in locally grown grape and stinging nettle that can effectively inhibit the growth of colon cancer cells. Researchers investigated anti-proliferation impact from extracts of grape pomace (Chardonnay and Tinta Cao) and stinging nettle (California and Canadian) on HT-29 and Caco-2 colon cancer cell lines.

Results

Both of the grape varieties and stinging nettle significantly inhibited colon cancer cell growth in vitro after four days of treatment. The Chardonnay grape inhibited the proliferation of Caco-2 by 60% and the Tinta Cao grape inhibited proliferation by 70%. The Tinta Cao inhibited HT-29 colon cancer cell proliferation by 65% and the Chardonnay inhibited proliferation by 66 %. The California stinging nettle variety reduced the proliferation of HT-29 colon cancer cell growth by 38%, and the Canadian variety reduced it by 24%. This work may benefit farmers by providing additional income from waste byproducts of grape that are regularly thrown out and from stinging nettle which is currently considered a weed.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Food, nutrition, and health - The economy (i.e. employment opportunities, etc.) can directly influence food purchases and food security of adults and families and furthermore weight status. Public policy changes, such as the Affordable Healthcare Act, may impact a multitude of factors related to food, nutrition, health, and healthcare access in 2011 and beyond. Several populations, particularly Hispanic and African American individuals, have higher rates of obesity. With population shifts within Virginia, it is possible to see changes in obesity prevalence rates.

Vector-borne diseases and public health pests - Temperature, weather, and migration patterns can influence the proliferation of vector-borne and infectious diseases.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Food, nutrition, and health - Numerous research studies are being conducted to identify contributors and strategies to address obesity, cardiovascular disease, cancer, and overall health, from bench to behavior and across the socio-ecological framework. Within the extension system in Virginia, ongoing evaluation studies are conducted to demonstrate the effectiveness of two of the hallmark USDA nutrition education programs, EFNEP and SNAP-Ed. Participants completing the EFNEP and SNAP-Ed series of six lessons improved nutrition and food behavior. Post-lesson data gathered through behavior change questionnaires in EFNEP have shown: 51% used food labels more often to make food choices; 96.3% of participants improved their diet; 40% increased their fruit consumption; 48% increased consumption of calcium rich foods. In SNAP-Ed, post-test data reported: 49% used food labels more often to make food choices; and 81% of participants improved their diets.

Vector-borne diseases and public health pests - Several notable findings have been reported and examined, particularly related to gene and molecular mechanisms. For example, 355 mosquito genes that are primarily regulated at the translational level after ingestion of Plasmodium-infected blood. Elucidating functions of the newly identified genes will undoubtedly advance understanding of the pathogen-vector interactions, and provide novel targets for blocking transmission of the mosquito-borne diseases. Another research lab has characterized the expression of novel promoters derived from mosquito heat shock genes in transgenic *Aedes aegypti* (yellow fever mosquito). These promoters exhibit a heat-inducible phenotype with robust activity in all tissues and life stages. Finally, several molecular pathways have also been identified for the transmission of arboviral diseases. These tools will be helpful for both basic research aimed at understanding mosquito-virus interactions as well as applied work to generate mosquito populations unable to transmit arboviruses such as those which cause dengue or yellow fever, which may ultimately lead to the exploration of several potential applications to limit the future impact of arboviruses on public health.

Related to bed bugs, genetic differences between pyrethroid-sensitive and resistant strains of bed bugs using next-generation high-throughput sequencing have also been examine. Genes encoding protein products likely to be involved in metabolic resistance or target-site insensitivity were identified from the sequences data and subject to further characterization.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Food Safety

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	5%	0%	0%	0%
501	New and Improved Food Processing Technologies	20%	0%	25%	0%
502	New and Improved Food Products	25%	0%	25%	25%
702	Requirements and Function of Nutrients and Other Food Components	0%	0%	0%	25%
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	25%	0%	25%	0%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	25%	100%	25%	50%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	10.2	0.5	5.6	3.0
Actual Paid Professional	13.2	0.5	14.2	1.0
Actual Volunteer	162.0	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
139436	158799	266898	168427
1862 Matching	1890 Matching	1862 Matching	1890 Matching
462225	106781	768811	184975
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1170116	0	3096803	250

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

2. Brief description of the target audience

Retail and food service employees, retail and food service management, temporary food vendors, child care providers, young adults (ages 25-59), older adults (ages 60 and older), Extension educators, and commercial food processors.

3. How was eXtension used?

We have been active in the Food Safety eXtension portal. Extension agents and specialists have been active in publishing content to the eXtension site as well as provided answers to "ask the expert" questions.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12395	16991	652	72

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	3	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of food service managers, supervisors and food handling personnel from restaurants, cafeterias, daycare and other food service facilities completing food safety training offered by extension educators in Virginia

Year	Actual
2011	1304

Output #2

Output Measure

- Number of home-based food business workshops conducted for food product formulation, facility planning, food processing and safety, product evaluation, food packaging and labeling, and record keeping.

Year	Actual
2011	4

Output #3

Output Measure

- Number of short-courses provided on food safety practices including HACCP training, Good Agricultural Practices and recall workshops to industry personnel, consumer organizations, Extension Agents and to local, state, and federal health inspectors

Year	Actual
2011	22

Output #4

Output Measure

- Number of research projects completed or in progress in the area of food safety.

Year	Actual
2011	6

Output #5

Output Measure

- Food Safety - Number of home based business entrepreneurs that have products evaluated for their safety by the 'Food Processor Technical Assistance Program' to prevent foodborne illness across the commonwealth.

Year	Actual
2011	45

Output #6

Output Measure

- Number of Virginia consumers completing training on how to safely preserve foods at home

Year	Actual
2011	422

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase in the number of food handlers (managers, supervisors, and food handling personnel from restaurants, public school and hospital cafeterias, daycare centers, nursing homes, university food service, correctional centers, civic/community groups and volunteers) who increase knowledge and skills in safe food handling practices.
2	Increase in number of home-based business entrepreneurs that increase awareness and knowledge in producing safe high acid and acidified food products.
3	Increase in number of discoveries from completed food related research projects which focus on enhancing the safety of the Nation's food supply and the development of value added foods.
4	Number of food companies who register with FDA and prepare a food biosecurity plan.
5	Food Preservation - Increase in the number of consumers that increase their knowledge on how to safely preserve foods at home.
6	Number of commercial poultry growers adopting biosecurity practices to lower the risk of disease transmission
7	Increase in food safety knowledge of industry personnel, consumer organizations, Extension Agents and to local, state, and federal health inspectors; as obtained through HACCP training, Good Agricultural Practices training and recall workshops.
8	Microbiological and Chemical Safety of Raw Foods Sold on the Internet Markets

Outcome #1

1. Outcome Measures

Increase in the number of food handlers (managers, supervisors, and food handling personnel from restaurants, public school and hospital cafeterias, daycare centers, nursing homes, university food service, correctional centers, civic/community groups and volunteers) who increase knowledge and skills in safe food handling practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Foodborne illness significantly affects public health in the United States and the overall cost to the public is high. The Centers for Disease Control and Prevention estimate there are 48 million cases of foodborne illness per year resulting in 128,000 hospitalizations and 3,000 deaths. The mean economic cost of foodborne illness is estimated to be approximately \$152 billion dollars per year. This equates to an estimated cost between \$1850.00* per foodborne illness case.

Between 2000 and 2006, the state of Virginia averaged 17 foodborne outbreaks per year resulting in an average of 578 confirmed cases (sick individuals) per year. For each confirmed case there are an estimated 20-38 unconfirmed cases². Between 11,560 and 21,964 Virginians suffered from foodborne illness each of those years. The estimated economic loss from foodborne illness in Virginia during those years may be between 21 and 40 million dollars per year.

The top factors which contribute to foodborne illness are: inadequate cooking, improper holding temperatures, contaminated equipment, poor personal hygiene and food from unsafe sources. Safe food handling and preparation by food handlers can dramatically reduce illness and health costs.

What has been done

In 2011 VCE conducted food handler trainings across the state including:
?34 manager food safety certification courses (16 hour nationally recognized certification program) were provided to 463 individuals from the food service industry, schools, senior and day

care centers across the state.

?24 employee food safety certification courses (6 to 10 hour trainings) were provided to 405 individuals were food handlers preparing foods in non-supervisory roles

? 34 general safe food handling and preparation courses were provided to 436 individuals. These included consumers preparing foods in their homes, individuals from non-profit organizations such as church, civic groups and public service organizations preparing food occasionally for the public.

12 family and consumer sciences Extension educators provided these programs in over 36 counties across the state. Over 459 restaurants, schools, day care centers, churches, civic groups, public service organizations and other locations sent individuals to VCE to complete food safety training.

Results

Food handler trainings were evaluated to determine the knowledge and behavior changes of participants. Of those who completed pre and post evaluations, 97% increased their knowledge of food safety practices.

10% of participants responded to a follow-up survey. Of respondents, 99% adopted at least one new food safety behavior including,

?96% improved time and temperature practices

?99% made changes to prevent food contamination

?95% made changes to personal hygiene practices

In addition, respondents shared food safety information with 422 additional food handlers.

It is conservatively estimated that if one case of foodborne illness is prevented per food handler completing proper food safety training and application through VCE, this translates into a potential annual savings of approximately \$2.4 million for the state of Virginia. This savings is calculated from the estimated economic burden of foodborne illness⁵.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Increase in number of home-based business entrepreneurs that increase awareness and knowledge in producing safe high acid and acidified food products.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	45

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Food processors in Virginia are in need of guidance on formulation and regulation of their products in order to produce safe and wholesome food products that are in compliance with local and federal regulations. The importance of a good source for education and input is especially important in recent years as many Virginians are seeking to start their own food businesses as a source of supplemental income in hard economic times.

What has been done

The Food Innovations program was developed to meet the demand for education and guidance for food processors in Virginia. The program is in the developmental stages, with focus on 1)ability to educate processors, 2)analysis of food products and providing recommendations for formulation and processing based on the analysis 3)providing official documents to food processors to file with the FDA when necessary 3) provide feedback on product labeling and provide assistance in developing nutrition facts panels 4)consulting with individuals or companies who need technical food processing assistance and 5) providing food safety and food processing training courses to food processors, consumers, extension agents, and government agents in need.

Results

With the Food Innovations program in development since July 2011, educational material have been developed to cover over 25 topics relating to starting a food business, spanning 5 areas including Addressing Business Needs, The Science of Food Safety and Quality, Food Regulations and Compliance, Food Labeling, and Miscellaneous Food Info.

Although the program is not yet open for service to the public and has not been advertising services, over 45 individuals have contacted the Director for information regarding food processing, food safety, labeling, and food regulations.

Three separate groups interested in establishing a food processing facility for use in their region have been in contact with the Director in regards to food safety, regulations, feasibility, and technical advise.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Increase in number of discoveries from completed food related research projects which focus on enhancing the safety of the Nation's food supply and the development of value added foods.

2. Associated Institution Types

- 1862 Research
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Foodborne illnesses are a major problem in the United States. According to CDC, each year about 1 in 6 Americans (or 48 million people) gets sick, and 3,000 die of foodborne illness (FBI).

What has been done

The following research projects were conducted by faculty at Virginia Tech and Virginia State University:

?A hand-held ultrasonic device was evaluated for enhancing the recovery of *Listeria innocua* bacteria from the surface of high density polyethylene (HDPE) plastic.

?To understand survival of tomato outbreak associated *Salmonella* serotypes in soil and water, their populations were examined in each media over a period of 40 days.

?Innovative strategies were developed to detect, monitor, and control mycotoxin contamination in wheat and barley.

?Mycotoxin production potential in eastern populations was examined.

?Compounds were extracted from jalapeno peppers and fractionated using high-performance liquid chromatography (HPLC) and examined for antimicrobial activity.

?The microbial quality of ground beef and ground beef patties sold at local (Virginia) and Internet (U.S.) retail markets. Locally purchased raw ground beef (LRG) and frozen beef patties (LFP) and Internet procured frozen ground beef (IFG) and frozen beef patties (IFP), were tested.

Results

Virginia Tech and Virginia State researchers made strides to enhance the safety of the food supply. Some of the key discoveries and impacts include:

?The use of ultrasonic devices leads to faster and more accurate enumeration of surface contaminants while enhancing recovery rates.

?At the end of 40 days, populations of Salmonella in soil dropped by 2.59 log CFU/g and 5.11 log CFU/g when enumerated on Tryptic Soy Agar Yeast Extract (TSAYE) and xylose lysine Tergitol 4 (XLT4) agar respectively. Salmonella populations in water reduced by 2.55 log CFU/ml (TSAYE, enumeration) and 2.94 log CFU/ml (XLT4, enumeration).

?Improved the ability of Virginia wheat and barley to compete in national and global markets, and has broadly improved food safety and security in the United States by providing accurate and timely mycotoxin testing services for DON in raw grain.

?Identifying fractions of Jalapeno peppers that significantly lowered growth of *Listeria monocytogenes*, *Salmonella enterica* and *E. coli* O157:H7.

?About 5.0, 11.1, 10.5, and 7.9% of LRG, LFP, IFG, and IFP samples were contaminated with *L. monocytogenes*. This study identified differences in microbial quality between local and Internet products.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
702	Requirements and Function of Nutrients and Other Food Components
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #4

1. Outcome Measures

Number of food companies who register with FDA and prepare a food biosecurity plan.

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Food Preservation - Increase in the number of consumers that increase their knowledge on how to safely preserve foods at home.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	422

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 \$762,362 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 in 2011. 16 extension educators provided home food preservation support in over 36 counties.

Education offered across the state included:

?8 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.

?32 high acid (jams, jellies, pickles, fruits, etc..) canning classes demonstrating hands on canning using a boiling water bath canner

?21 low acid (vegetables, meats, fish, etc?) canning classes demonstrating hands on canning using a pressure canner

?234 dial gauge inspections for accuracy.

?364 one-on-one individualized home preservers support via phone/e-mail

Results

Select groups of 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.

422 participants increased their knowledge in the following areas

?295 learned how to can low acid foods using a pressure canner

?295 learned how to can high acid foods using a boiling water bath canner

?412 learned the difference between high and low acid foods and why the method of canning selected for each is important

?198 learned how to make jams/jellies and other fruit spreads

- ?75 learned how to make pickles, relishes and other fermented vegetables
- ?34 learned how to dehydrate foods
- ?189 learned how to freeze foods

Select participants identified changing the following behaviors as a result of this training:

- ?180 can low acid foods using a pressure canner
- ?222 use safe food preservation techniques
- ?129 freeze more foods
- ?11 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 (248), 60% (150) 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 can be approximately 114 million dollars. This savings is calculated from the estimated economic burden of foodborne illness.

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 #6

1. Outcome Measures

Number of commercial poultry growers adopting biosecurity practices to lower the risk of disease transmission

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Increase in food safety knowledge of industry personnel, consumer organizations, Extension Agents and to local, state, and federal health inspectors; as obtained through HACCP training, Good Agricultural Practices training and recall workshops.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	976

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Foodborne illnesses are still a major problem in the United States. According to CDC, each year about 1 in 6 Americans (or 48 million people) gets sick, and 3,000 die of foodborne illness (FBI) and that training and education is a vital link for the prevention of FBI along the food chain -from farm to table.

What has been done

To increase food safety handling practices knowledge and implementation, four (4) English and four (4) Spanish Good Manufacturing Practices (GMP's) trainings were provided to a total of 177 seafood processing companies' employees in the state of Virginia. Eight (8) English and two (2) Spanish seafood HACCP trainings were provided to a total of 181 seafood processing employees nationally and internationally; one (1) Spanish seafood sanitation control procedures was provided to 22 seafood processors in Mexico. One (1) Meat and Poultry HACCP training provided to 16 employees from the industry and one (1) Juice HACCP to 20 employees of a juice company in Virginia were provided under the direction of CALS FST Faculty. Good agricultural practices (GAPs) training in the areas of pre-plant, harvest, post-harvest, transportation, worker hygiene were provided to 560 individual producers, small fresh fruit and vegetable producers, Extension agents and other industry personnel.

Results

All participants in these food safety trainings increased their knowledge in the importance of implementing safe practices for their respective industries. Participation in these food safety bilingual trainings assist food companies and retail service establishments to continue to maintain a trained staff that can effectively identify and control food safety hazards to prevent foods from becoming unsafe to consumers. Since a high portion of employees in these industries are Spanish speakers, providing trainings in Spanish decreases the chance for misunderstanding of work expectations and allows for the proper application and performance of required duties. One company commented that "training provided by Virginia Seafood AREC is helping our company meet requirements for VDHSS, FDA and Veterinary Command. The bilingual courses provided an invaluable service when it comes to training our Spanish speaking employees".

For a significant portion of the GAP's trainees, this was their first exposure of any kind to the GAPs program. Of the farms and packers trained, 12% have requested and passed USDA GAP audits over a multi-state area with a 100% pass rate. Presently, 50% of Virginia farms listed by USDA as passing GAP certification have participated in extension sponsored training sessions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources

712

Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #8

1. Outcome Measures

Microbiological and Chemical Safety of Raw Foods Sold on the Internet Markets

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In the United States, many food items (including meat products) can be marketed directly to consumers by producers or distributors across the country through the Internet. Some of the Internet companies are advertised as family-owned ranches or small-scale plants that sell specialty items. This business approach satisfies consumer's desires in procuring perceived high-quality products directly from producers or stores by mail delivery. Previously, Virginia State University researchers reported the prevalence of *Listeria monocytogenes* and enterotoxigenic *Bacillus* spp., respectively, in raw fish fillets and sprouting seeds procured through the Internet. However, food safety data related to other food products including frozen ground beef market is lacking.

What has been done

In the last several years researchers evaluated the microbial quality of ground beef and ground beef patties sold at local (Virginia) and Internet (U.S.) retail markets. A total of 152 ground beef products, consisting of locally purchased raw ground beef (LRG) and frozen beef patties (LFP) and Internet procured frozen ground beef (IFG) and frozen beef patties (IFP), were tested.

Results

Results showed that LFP had significantly lower levels of aerobic mesophiles, psychrotrophs, and coliforms than LRG, IFG, and IFP. Furthermore, IFG had greater *E. coli* numbers than LRG and LFP. No sample was contaminated with *E. coli* O157:H7 but one duplicate set of summer LFP samples contained *Salmonella*. *Listeria* spp. was present respectively in 25 and 29% of samples from local and Internet markets. About 5.0, 11.1, 10.5, and 7.9% of LRG, LFP, IFG, and IFP samples were contaminated with *L. monocytogenes*. This study identified differences in microbial quality between local and Internet products. Careful handling and thorough cooking of ground

beef products, regardless of market source, is recommended to prevent food borne illness. These studies showed that Internet meat products are either equally or more likely to have excessive microbial contamination, including E. coli, than locally purchased products. Thus, effective education and/or extension services are needed to support the healthy development of this emerging market.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Virginia Tech does not currently have faculty working in the biosecurity area, resulting in nothing to report in two of our outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluation for programs reported was completed in a variety of ways. Some of the evaluation methods include use of pre/post tests for knowledge gain, and 3-6 month follow up surveys to determine behavior change.

Key Items of Evaluation

Many times working with producers can be a one on one experience for the educator. Many of the evaluation methods used for the Good Agricultural practices program were done on a one on one basis, where Extension educators worked through the GAPs audit with each individual producer and gained very deep insightful evaluation data.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Global Food Security and Hunger - Agricultural systems

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	10%	10%	10%	0%
111	Conservation and Efficient Use of Water	10%	10%	10%	0%
112	Watershed Protection and Management	10%	10%	10%	0%
131	Alternative Uses of Land	10%	10%	10%	0%
205	Plant Management Systems	10%	10%	10%	0%
307	Animal Management Systems	10%	10%	10%	0%
402	Engineering Systems and Equipment	10%	10%	10%	0%
403	Waste Disposal, Recycling, and Reuse	10%	10%	10%	0%
601	Economics of Agricultural Production and Farm Management	10%	10%	10%	0%
605	Natural Resource and Environmental Economics	10%	10%	10%	0%
	Total	100%	100%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	107.2	9.0	97.7	8.5
Actual Paid Professional	5.8	1.0	6.2	0.0
Actual Volunteer	369.0	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
60962	160949	116689	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
202087	234536	336128	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
511581	101333	1353938	0

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.

2. Brief description of the target audience

Commercial producers
4-H youth
Master Gardeners
State and federal agency personnel
Extension educators
Policy makers
Consumers
Supermarket chain store buyers

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	118328	65583	27698	1991

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	20	27	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of farmers creating succession/transition plans for their farm business
Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of education programs conducted in farm and agribusiness management and risk management
Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Number of education programs conducted in marketing and direct marketing
Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Number of agriculture systems educator training workshops.

Year	Actual
2011	15

Output #5

Output Measure

- Number of agriculture systems field research experiments

Year	Actual
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2011

57

Output #6

Output Measure

- Number of agriculture systems on-farm demonstrations

Year

Actual

2011

13

Output #7

Output Measure

- Number of agriculture systems producer training workshops

Year

Actual

2011

135

Output #8

Output Measure

- Number of non-peer reviewed outreach citations incorporating information on the most effective IPM strategies and systems for use on selected commodities and/or at selected sites
Not reporting on this Output for this Annual Report

Output #9

Output Measure

- Number of private applicators trained for certification
Not reporting on this Output for this Annual Report

Output #10

Output Measure

- Number of commercial applicators trained for certification
Not reporting on this Output for this Annual Report

Output #11

Output Measure

- Number of private applicators trained for recertification
Not reporting on this Output for this Annual Report

Output #12

Output Measure

- Number of commercial applicators trained for recertification
Not reporting on this Output for this Annual Report

Output #13

Output Measure

- Number of non-certified applicators trained
Not reporting on this Output for this Annual Report

Output #14

Output Measure

- Number of stakeholders enrolled in the IPM Stakeholder Network
Not reporting on this Output for this Annual Report

Output #15

Output Measure

- Number of trainers and regulatory officials trained
Not reporting on this Output for this Annual Report

Output #16

Output Measure

- Educational media website hits communicated through the Pesticide Safety Education website
Not reporting on this Output for this Annual Report

Output #17

Output Measure

- Number of non-peer reviewed research citations incorporating information on the most effective IPM strategies and systems for use on selected commodities and/or at selected sites.

Year	Actual
2011	0

Output #18

Output Measure

- Number of presentations on IPM related topics.
Not reporting on this Output for this Annual Report

Output #19

Output Measure

- Number of volunteer hours dedicated to pest management programming
Not reporting on this Output for this Annual Report

Output #20

Output Measure

- Number of extended learners with four or more hours of contact related to pest management
Not reporting on this Output for this Annual Report

Output #21

Output Measure

- Amount of revenue generated in dollars for pest management Extension and research programming
Not reporting on this Output for this Annual Report

Output #22

Output Measure

- IPM publications for clientele including extension publications, manuals and guides, multi-media pieces, websites, newspaper and trade journal articles, and papers provided at production meetings and field days.
Not reporting on this Output for this Annual Report

Output #23

Output Measure

- Number of samples evaluated by current and improved plant diagnostic methods
Not reporting on this Output for this Annual Report

Output #24

Output Measure

- Number of plants and plant products educational presentations conducted
Not reporting on this Output for this Annual Report

Output #25

Output Measure

- Number of plants and plant products volunteers
Not reporting on this Output for this Annual Report

Output #26

Output Measure

- Number of plants and plant products research citations
Not reporting on this Output for this Annual Report

Output #27

Output Measure

- Number of plants and plant products extension/outreach citations

Year	Actual
2011	0

Output #28

Output Measure

- Number of programs offered regarding community food systems.

Not reporting on this Output for this Annual Report

Output #29

Output Measure

- Number of existing and future nutrient management planners and educators trained

Year	Actual
2011	41

Output #30

Output Measure

- Number of animals and animal products educational meetings, workshops, conferences, training sessions, and field days

Not reporting on this Output for this Annual Report

Output #31

Output Measure

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

Not reporting on this Output for this Annual Report

Output #32

Output Measure

- Number of animal and animal products web sites, applications, and modules

Not reporting on this Output for this Annual Report

Output #33

Output Measure

- Number of biotechnology and genomics research projects in program areas

Not reporting on this Output for this Annual Report

Output #34

Output Measure

- Number of peer reviewed biotechnology and genomics research papers published

Not reporting on this Output for this Annual Report

Output #35

Output Measure

- Number of biotechnology and genomics presentations

Not reporting on this Output for this Annual Report

Output #36

Output Measure

- Number of non-peer-reviewed biotechnology and genomics publications
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 the number of land owners who implement transition plans.
2	Increase the number of program participants (farmers, agricultural business managers and leaders, food processors, government agencies, and agribusiness firms) making more informed business and economic decisions.
3	Increase the number of adult participants who report that they ran out of food less often after participating in the Family Nutrition Program.
4	Percent increase in gross income from agriculture attributable to extension efforts.
5	Increase in farms and acres subject to organic management due to extension programming efforts which will increase overall profitability of organic agriculture (total annual sales).
6	Increase in the amount of agricultural land under best management practices due to extension programming efforts.
7	Increase in the number of individuals improving water quality and reducing erosion through participation in an advanced grazing system program.
8	Increase in the number of nutrient management plans, resulting in more efficient utilization of nutrients, and in the number of plan writers trained by Extension.
9	Increase the profitability (total annual sales) of small, part-time and limited resource farmers through sustainable production of specialty agriculture crops and livestock products.
10	Number of individuals gaining knowledge of IPM through training course completion and/or examination
11	Number of applicators who gain knowledge in pesticide safety through certification training and pass the state certification exam(s)
12	Number of applicators who gain additional knowledge in pesticide safety through re-certification training and sufficient credit to maintain their certification
13	Number of applicators, farm workers, and the general public who gain knowledge in general pesticide safety who are not seeking certification as pesticide applicators
14	Number of trainers who gain knowledge in pesticide safety and pesticide curriculum and program training in established train-the-trainer workshops
15	Number of pesticide drift violations prosecuted by VDACS remains at 10 or below.
16	Threshold number of personal protective equipment violations prosecuted by VDACS
17	Through educational programming and collaborative efforts, support the collection and proper disposal of unwanted pesticides in Virginia localities.

18	Number of localities participating in a pesticide container recycling program.
19	Number of participants gaining knowledge about invasive NIS
20	Increase the number of stakeholders collaborating with pest management strategic planning activities -- which support the communication of the pest management needs of Virginia and regional agricultural interests to pesticide regulatory policymakers.
21	Increase in the number of facilities that are impacted in a positive way by IPM program activities.
22	Number of Virginia soybean growers aware of Asian soybean rust risk to their crop.
23	Number of Virginia soybean growers who apply fungicide based on Asian soybean rust detection activities
24	Increase the number of commercial producers educated about new plants, cultivated varieties, production techniques or BMPs
25	Increase the number of commercial producers adopting new plants, cultivated varieties, production techniques, or BMPs
26	Increase the number of noncommercial gardeners/producers educated about new techniques or BMPs
27	Increase the number of noncommercial gardeners adopting new techniques or BMPs
28	Number of new cultivated varieties released
29	Increased number of acres dedicated to vegetable and berry specialty crops to enhance agricultural profitability.
30	Increase in the number of commercial producers educated about the reuse, recycling and utilization alternatives for agricultural plastics.
31	Increase the yield, input efficiency (fertilizer, fungicides, insecticides, herbicides, irrigation, etc.), and profit for Virginia vegetable farmers.
32	Local 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.
33	Number of community gardening programs implemented to address food insecurity/hunger issues
34	Percent increase in beef cattle marketed through value-added programs
35	Number of additional beef producers trained and certified for quality assurance/best management practices
36	Percent of participating farms reducing phosphorus over previous year in dairy animal waste

37	Number of dairy herds improving milk quality by culturing quarter milk samples and implementing mastitis control procedures.
38	Number of swine producers receiving continuing education credit for waste management permit requirements
39	Number of youth adopting best practices related to animal agriculture through youth animal projects and events
40	Percent increase in sheep population in Southwest Virginia as a result of favorable lamb marketing arrangements
41	Number of program participants acquiring knowledge on best management practices related to equine.
42	Percent increase in freshwater shrimp production by Virginia farmers utilizing best management practices
43	Percent increase in sales of pond raised fish due to adoption of best management practices.
44	Increased fish production via recirculating aquaculture system (RAS) and pond production techniques through innovative research and dissemination and application of results through VCE programming to producers.
45	Number of individuals who gain knowledge to improve small ruminant production.
46	Number of commercial poultry growers adopting biosecurity practices to lower the risk of disease transmission
47	Number of projects addressing genetic improvement of aquaculture stocks
48	Number of projects to reduce impact of biotic and abiotic factors on food security
49	Number of projects to improve quality of food crop plants through genetic and metabolomic research
50	Projects manipulating genomes of insects vectoring diseases

Outcome #1

1. Outcome Measures

Increase the number of land owners who implement transition plans.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Increase the number of program participants (farmers, agricultural business managers and leaders, food processors, government agencies, and agribusiness firms) making more informed business and economic decisions.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Increase the number of adult participants who report that they ran out of food less often after participating in the Family Nutrition Program.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Percent increase in gross income from agriculture attributable to extension efforts.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Improved financial security of individuals, families, and agricultural businesses is critical for the long-term economic health of Virginia. Profitable and successful farms and small businesses are the cornerstone of robust families and the communities in which they live. Crop and livestock producers need to balance farm and feed resources to maximize profits.

What has been done

Agents and specialists conducted on-farm demonstrations, field days, and workshops that demonstrated profitable practices to producers. Crop variety and management evaluations, profitable dairy production strategies meetings, beef production programs, and many other specialty crop and animal production meetings and demonstrations were held.

Results

Agricultural profitability decreased in Virginia last year, due to higher input costs and lower commodity prices

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics

Outcome #5

1. Outcome Measures

Increase in farms and acres subject to organic management due to extension programming efforts which will increase overall profitability of organic agriculture (total annual sales).

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	400000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Organically raised products often garner a premium from consumers, enhancing producer's profitability.

What has been done

Meetings, demonstrations, and a large conference, the Virginia Biological Farming Conference were used to educate and teach the process of organic production.

Results

Farmers, USDA agriculture professionals, representatives from non-government organizations and youth attended the conference and meetings. Virginia producers reported organic sales equal to about one percent of all U.S. organic sales.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
205	Plant Management Systems

Outcome #6

1. Outcome Measures

Increase in the amount of agricultural land under best management practices due to extension programming efforts.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	550000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Approximately 25 percent of Virginia's land area is used for some kind of agricultural activity and these activities can be the source of nutrients and sediment pollution. Best management practices (BMPs) reduce these losses and improve water and ecosystem quality.

What has been done

Virginia's five priority agricultural conservation practices have been, and will continue to be, a focus for additional reductions. These include:

- * Nutrient Management Planning
- * Cover Crops
- * Conservation Tillage
- * Riparian Buffers
- * Livestock Exclusion

Results

To date more than 550,000 acres of agricultural land is managed using BMPs that support many positive ecosystem services and protect water quality in the Chesapeake Bay. Agricultural clients statewide depend on VCE to provide information about benefits and implementation of these BMPs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
403	Waste Disposal, Recycling, and Reuse
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics

Outcome #7

1. Outcome Measures

Increase in the number of individuals improving water quality and reducing erosion through participation in an advanced grazing system program.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Grazing animals make up a large portion of Virginia's agricultural income and their management affects millions of acres. Water quality can be negatively impacted by poor grazing practices and overgrazing.

What has been done

Conferences, short courses, regional meetings and other trainings have been conducted to demonstrate the economic and environmental advantages of advanced grazing systems.

Results

Additional fencing and advanced grazing techniques have been implemented.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
205	Plant Management Systems
307	Animal Management Systems

Outcome #8

1. Outcome Measures

Increase in the number of nutrient management plans, resulting in more efficient utilization of nutrients, and in the number of plan writers trained by Extension.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	288000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

All large animal feeding operations in Virginia, biosolids applicators and many farms that receive cost share money, are required to have nutrient management plans.

What has been done

Twice a year we conduct a two day science-based training on soils and crop production that the planners undergo before taking the nutrient management exam. We also do the Phosphorus Index component of the three day session organized by the Department of Conservation and Recreation.

Results

This year we trained a total of 41 new nutrient management planners. These planners and those certified in previous years wrote over 200,000 acres of nutrient management plans for permitted farms this year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
205	Plant Management Systems
307	Animal Management Systems
403	Waste Disposal, Recycling, and Reuse
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics

Outcome #9

1. Outcome Measures

Increase the profitability (total annual sales) of small, part-time and limited resource farmers through sustainable production of specialty agriculture crops and livestock products.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
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2011

2000000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Improved financial security of individuals, families, and agricultural businesses is critical for the long-term economic health of Virginia. Profitable and successful farms and small businesses are the cornerstone of robust families and the communities in which they live. Producers need to balance farm resources and purchased inputs to maximize profits. Many small farmers in Virginia are growing niche market crops. They are selling these crops at farmers markets to maximize net revenue per acre compared to growing commodity crops (e.g. corn, wheat, soybeans) whose prices are determined on world markets. Since niche market crops are grown on limited acres in the nation, it is extremely difficult to find enterprise budgets for these crops.

What has been done

Enterprise budgets for niche market crops such as blue berries, black berries, straw berries, raspberries, water melons, cantaloupes, okra, baby lima beans, cut flowers fresh market tomatoes and sweet corn, and bell peppers, black turtle beans, goat production and brown eggs were aggregated and budgets were sent to Agriculture Management Agents in the Small Farm Outreach Program at VSU

Results

Producers gained knowledge to determine breakeven costs for niche market crops grown on their small farms. Then the producers were able to set sales prices that were greater than their costs of production and determine net profit for each crop grown. Consequently, producers will be able to determine the optimal acreage of crops to be grown that would maximize profitability their farms.

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 #10

1. Outcome Measures

Number of individuals gaining knowledge of IPM through training course completion and/or examination

Not Reporting on this Outcome Measure

Outcome #11

1. Outcome Measures

Number of applicators who gain knowledge in pesticide safety through certification training and pass the state certification exam(s)

Not Reporting on this Outcome Measure

Outcome #12

1. Outcome Measures

Number of applicators who gain additional knowledge in pesticide safety through re-certification training and sufficient credit to maintain their certification

Not Reporting on this Outcome Measure

Outcome #13

1. Outcome Measures

Number of applicators, farm workers, and the general public who gain knowledge in general pesticide safety who are not seeking certification as pesticide applicators

Not Reporting on this Outcome Measure

Outcome #14

1. Outcome Measures

Number of trainers who gain knowledge in pesticide safety and pesticide curriculum and program training in established train-the-trainer workshops

Not Reporting on this Outcome Measure

Outcome #15

1. Outcome Measures

Number of pesticide drift violations prosecuted by VDACS remains at 10 or below.

Not Reporting on this Outcome Measure

Outcome #16

1. Outcome Measures

Threshold number of personal protective equipment violations prosecuted by VDACS

Not Reporting on this Outcome Measure

Outcome #17

1. Outcome Measures

Through educational programming and collaborative efforts, support the collection and proper disposal of unwanted pesticides in Virginia localities.

Not Reporting on this Outcome Measure

Outcome #18

1. Outcome Measures

Number of localities participating in a pesticide container recycling program.

Not Reporting on this Outcome Measure

Outcome #19

1. Outcome Measures

Number of participants gaining knowledge about invasive NIS

Not Reporting on this Outcome Measure

Outcome #20

1. Outcome Measures

Increase the number of stakeholders collaborating with pest management strategic planning activities -- which support the communication of the pest management needs of Virginia and regional agricultural interests to pesticide regulatory policymakers.

Not Reporting on this Outcome Measure

Outcome #21

1. Outcome Measures

Increase in the number of facilities that are impacted in a positive way by IPM program activities.

Not Reporting on this Outcome Measure

Outcome #22

1. Outcome Measures

Number of Virginia soybean growers aware of Asian soybean rust risk to their crop.

Not Reporting on this Outcome Measure

Outcome #23

1. Outcome Measures

Number of Virginia soybean growers who apply fungicide based on Asian soybean rust detection activities

Not Reporting on this Outcome Measure

Outcome #24

1. Outcome Measures

Increase the number of commercial producers educated about new plants, cultivated varieties, production techniques or BMPs

Not Reporting on this Outcome Measure

Outcome #25

1. Outcome Measures

Increase the number of commercial producers adopting new plants, cultivated varieties, production techniques, or BMPs

Not Reporting on this Outcome Measure

Outcome #26

1. Outcome Measures

Increase the number of noncommercial gardeners/producers educated about new techniques or BMPs

Not Reporting on this Outcome Measure

Outcome #27

1. Outcome Measures

Increase the number of noncommercial gardeners adopting new techniques or BMPs

Not Reporting on this Outcome Measure

Outcome #28

1. Outcome Measures

Number of new cultivated varieties released

Not Reporting on this Outcome Measure

Outcome #29

1. Outcome Measures

Increased number of acres dedicated to vegetable and berry specialty crops to enhance agricultural profitability.

Not Reporting on this Outcome Measure

Outcome #30

1. Outcome Measures

Increase in the number of commercial producers educated about the reuse, recycling and utilization alternatives for agricultural plastics.

Not Reporting on this Outcome Measure

Outcome #31

1. Outcome Measures

Increase the yield, input efficiency (fertilizer, fungicides, insecticides, herbicides, irrigation, etc.), and profit for Virginia vegetable farmers.

Not Reporting on this Outcome Measure

Outcome #32

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #33

1. Outcome Measures

Number of community gardening programs implemented to address food insecurity/hunger issues

Not Reporting on this Outcome Measure

Outcome #34

1. Outcome Measures

Percent increase in beef cattle marketed through value-added programs

Not Reporting on this Outcome Measure

Outcome #35

1. Outcome Measures

Number of additional beef producers trained and certified for quality assurance/best management practices

Not Reporting on this Outcome Measure

Outcome #36

1. Outcome Measures

Percent of participating farms reducing phosphorus over previous year in dairy animal waste

Not Reporting on this Outcome Measure

Outcome #37

1. Outcome Measures

Number of dairy herds improving milk quality by culturing quarter milk samples and implementing mastitis control procedures.

Not Reporting on this Outcome Measure

Outcome #38

1. Outcome Measures

Number of swine producers receiving continuing education credit for waste management permit requirements

Not Reporting on this Outcome Measure

Outcome #39

1. Outcome Measures

Number of youth adopting best practices related to animal agriculture through youth animal projects and events

Not Reporting on this Outcome Measure

Outcome #40

1. Outcome Measures

Percent increase in sheep population in Southwest Virginia as a result of favorable lamb marketing arrangements

Not Reporting on this Outcome Measure

Outcome #41

1. Outcome Measures

Number of program participants acquiring knowledge on best management practices related to equine.

Not Reporting on this Outcome Measure

Outcome #42

1. Outcome Measures

Percent increase in freshwater shrimp production by Virginia farmers utilizing best management practices

Not Reporting on this Outcome Measure

Outcome #43

1. Outcome Measures

Percent increase in sales of pond raised fish due to adoption of best management practices.

Not Reporting on this Outcome Measure

Outcome #44

1. Outcome Measures

Increased fish production via recirculating aquaculture system (RAS) and pond production techniques through innovative research and dissemination and application of results through VCE programming to producers.

Not Reporting on this Outcome Measure

Outcome #45

1. Outcome Measures

Number of individuals who gain knowledge to improve small ruminant production.

Not Reporting on this Outcome Measure

Outcome #46

1. Outcome Measures

Number of commercial poultry growers adopting biosecurity practices to lower the risk of disease transmission

Not Reporting on this Outcome Measure

Outcome #47

1. Outcome Measures

Number of projects addressing genetic improvement of aquaculture stocks

Not Reporting on this Outcome Measure

Outcome #48

1. Outcome Measures

Number of projects to reduce impact of biotic and abiotic factors on food security

Not Reporting on this Outcome Measure

Outcome #49

1. Outcome Measures

Number of projects to improve quality of food crop plants through genetic and metabolomic research

Not Reporting on this Outcome Measure

Outcome #50

1. Outcome Measures

Projects manipulating genomes of insects vectoring diseases

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Weather extremes affect all facets of production agriculture. The extent of of this impact depends of the severity of the weather events. The overall slow economic growth may reduce opportunites for lending and investment in agriculture. Higher input costs for crops and livestock may reduce opportunities for profits.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Global Food Security and Hunger - Animals and Animal Products

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	15%	15%	15%	15%
302	Nutrient Utilization in Animals	15%	15%	15%	15%
303	Genetic Improvement of Animals	10%	10%	10%	10%
305	Animal Physiological Processes	10%	10%	10%	10%
307	Animal Management Systems	20%	20%	20%	20%
308	Improved Animal Products (Before Harvest)	10%	10%	10%	10%
311	Animal Diseases	10%	5%	15%	5%
313	Internal Parasites in Animals	5%	10%	0%	10%
315	Animal Welfare/Well-Being and Protection	5%	5%	5%	5%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890

Actual Paid Professional	17.3	4.0	18.6	4.0
Actual Volunteer	844.0	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
182755	182065	349816	781235
1862 Matching	1890 Matching	1862 Matching	1890 Matching
605825	244408	1007658	857992
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1533637	0	4058888	104330

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research experiments, conduct workshops, meetings, trainings, develop publications, curriculum, resources, provide consultation, leadership, facilitation, partner with industry, and conduct needs assessment and impact.

2. Brief description of the target audience

The target audience includes animal owners, youth, Extension educators, allied industry personnel, consumers, policy makers, and academic colleagues.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	59658	93091	26199	3898

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	87	14	101

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of animals and animal products educational meetings, workshops, conferences, training sessions, and field days

Year	Actual
2011	487

Output #2

Output Measure

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

Year	Actual
2011	407

Output #3

Output Measure

- Number of animal and animal products web sites, applications, and modules

Year	Actual
2011	71

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percent increase in beef cattle marketed through value-added programs
2	Number of additional beef producers trained and certified for quality assurance/best management practices
3	Percent of participating farms reducing phosphorus over previous year in dairy animal waste
4	Number of dairy herds improving milk quality by culturing quarter milk samples and implementing mastitis control procedures
5	Number of swine producers receiving continuing education credit for waste management permit requirements
6	Number of youth adopting best practices related to animal agriculture through youth animal projects and events
7	Percent increase in sheep population in Southwest Virginia as a result of favorable lamb marketing arrangements
8	Number of program participants acquiring knowledge on best management practices related to equine.
9	Percent increase in freshwater shrimp production by Virginia farmers utilizing best management practices
10	Percent increase in sales of pond raised fish due to adoption of best management practices.
11	Increased fish production via recirculating aquaculture system (RAS) and pond production techniques through innovative research and dissemination and application of results through VCE programming to producers.
12	Number of individuals who gain knowledge to improve small ruminant production.
13	Introduction of cage aquaculture systems for Virginia farm ponds.
14	"Fish School" enhances small-scale aquaculture production.
15	Small Ruminant Production and Marketing in Virginia.
16	Chesterfield Technology Center and Appomattox High School Veterinary Sciences Program Partnership.
17	Anthelmintic Resistance and Usage by Small Ruminant Producers.

18	Accelerated Mating with Hair Sheep
19	Energetic Cost of Gastrointestinal Nematode Parasites in Sheep and Goats

Outcome #1

1. Outcome Measures

Percent increase in beef cattle marketed through value-added programs

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Adding value to Virginia's beef cattle operations is critical to sustainability of Virginia agriculture and rural communities. Adopting improved health, management, and marketing practices for Virginia feeder cattle adds value to the Commonwealth's second largest agricultural commodity.

What has been done

Extension Specialists partnered with the Virginia Cattlemen's Association to develop and administer this program which encourages the use of scientifically-based cattle health and management procedures for feeder cattle. The Virginia Quality Assured (VQA) program is a cooperative effort among VCE, the Virginia Cattlemen's Association, Virginia Department of Agriculture and Consumer Services, Virginia-Maryland Regional College of Veterinary Medicine, and producer organizations. Producers that manage their cattle in this manner are eligible to market their calves through the VQA certified feeder cattle program.

Results

In 2011, a total 8,725 calves were marketed through the VQA program. Producers received a premium of \$52 per calf resulting in \$456,946 of additional income for Virginia beef producers. Since 1997, producers have marketed over 118,000 head of feeder cattle resulting in \$4.2 million in value-added income.

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
308	Improved Animal Products (Before Harvest)
311	Animal Diseases

Outcome #2

1. Outcome Measures

Number of additional beef producers trained and certified for quality assurance/best management practices

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	523

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.

Results

The number of certified producers in Virginia currently stands at over 4500 which makes Virginia one of the national leaders in BQA activities. During 2011 there were 523 producers certified or re-certified. These producers represent over half of the beef produced in Virginia, and added value of cattle produced on BQA certified farms is estimated to be \$1.5 to \$2.0 million annually.

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
315	Animal Welfare/Well-Being and Protection

Outcome #3

1. Outcome Measures

Percent of participating farms reducing phosphorus over previous year in dairy animal waste

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	25

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Water quality is a significant issue in the Mid-Atlantic especially in the Chesapeake Bay drainage area. Phosphorus is a nutrient of concern by federal and state agencies. Reduction of phosphorus excretion results in less potential for pollution due to water runoff from fields.

What has been done

The Phosphorus Feeding Incentive Program is a collaborative program between Virginia Cooperative Extension, Virginia Tech Department of Dairy Science, and the Virginia Department of Conservation and Recreation. The program utilizes research-based dietary management of dairy cattle and an incentive program to reduce phosphorus feeding on dairy farms, thereby decreasing phosphorus run-off and potential pollution

Results

This was a three year project. At the peak participation, 29% of the Virginia dairy farms representing 35,000 cows were enrolled to determine if financial incentives would be successful in reducing P surplus on Virginia dairy farms. The initial evaluation revealed that farms averaged 30% overfeeding with a range of 70 to 215% of requirements. After three years of monitoring

participating herds it was evident that overfeeding of dietary P has declined. Although herds participating in the study declined with time, 74% of farms were feeding dietary P within 25% of requirements. Surveys of participating nutritionists revealed that they were feeding an additional 56,000 cows and all indicated that diets for non-study herds were fed similar diet P to project herds. This implied a reduction of phosphorus overfeeding of 732,000 lb. of P₂O₅ annually for Virginia dairy farms. A separate intensive feed management study revealed that use of computerized feed management software was a valuable tool in improving accuracy and precision of P feeding. The results of this study have been instrumental in developing an statewide extension program on feeding program management.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
307	Animal Management Systems

Outcome #4

1. Outcome Measures

Number of dairy herds improving milk quality by culturing quarter milk samples and implementing mastitis control procedures

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	47

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Producing high quality milk with low bacterial numbers, results in increased farm profitability, increased shelf life and improved food safety. The average herd in Virginia can earn an additional \$8,400 per year by producing milk of highest quality. However, milk quality bonuses are often missed due to the complexity and difficulty in achieving the cut-offs required for the premium payments. A new premium/penalty system was due to be initiated as of January 2010. This program involved the preliminary incubation (PI) count, one that many producers did not previously focus on, as it was not part of the payment scheme. This new premium program resulted in a surge of producers needing help troubleshooting problems related to high PI counts.

What has been done

A team of Extension and industry representatives formed with the mission to work together to troubleshoot VA farms with high PI counts and work until these farms were in a state where premiums were achieved. Specifically, our team worked closely with ten dairy producers in 2011. In each situation, it was a team effort to troubleshoot the problem, determine the cause, and recommend change and conduct follow-ups.

Results

Working intensively with these seven producers, we were able to improve milk quality counts on all farms. Evidence of impact was highly apparent in one particular situation. The PI count on this farm was consistently running 100,000-300,000 cells/ml. Premiums are awarded for counts less than 40,000 cells/ml (\$0.10-0.30/100 lbs of milk) and penalties are assessed when counts are above 100,000 cells/ml (\$1.00/100 lbs of milk). The start date for the penalties was April 2010 and this farm contacted us in December of 2009. Over the course of the next 4 months, our team of experts worked to troubleshoot the problem. Initial issues we found included an improperly functioning washing machine used to wash towels prior to milking, not enough soap dispensed into the washing machine and not enough hot water from the hot water heater. Our laboratory cultured the towels and found an overabundance of *Pseudomonas* spp., which was also the main bacterial contributor to the high PI count. We thought the contaminated towels must have been contributing to the high PI count and therefore, the washing machine was replaced and the hot water heater was repaired. Following these changes, the PI count dropped and remained steady at 30,000 cfu/ml. Although this was a considerable improvement, we continued to work to further lower the count below the goal of 10,000 cfu/ml. After many hours spent examining equipment function, milking procedures and wash procedures, we noticed that the gaskets were being removed from the milk weigh jars during cleaning and not replaced. This allowed the dirty wash water to run into the weigh jars and thus into the bulk tank. All of the gaskets were immediately replaced, farm personnel were informed this was not necessary to properly clean the equipment and within one month this farm was receiving their premium check (averages \$8,640/month). The counts on this farm remained low for several months, but this was followed by a steady incline. Over the past year, the PI counts at each pick up have ranged from <5,000 cfu/ml to nearly 100,000 cfu/ml. We are constantly working with this producer to find glitches in his system which would cause this to happen. In the past year, we found weigh jars without gaskets (despite previous training of milkers), lack of chlorine in the washing machine and improper milking preparation procedures. Despite a few high counts, this farm received the quality bonus each month this year, resulting in a yearly gain of \$103,600. This farm is just one example of how we, as a team, have made a significant impact to improve the milk quality on Virginia dairy farms.

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
305	Animal Physiological Processes
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
311	Animal Diseases

Outcome #5

1. Outcome Measures

Number of swine producers receiving continuing education credit for waste management permit requirements

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	168

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Pork producers who raise or sell market hogs to packers with process verified systems must be trained as certified Pork Quality Assured Plus (PQA-Plus) producers and producer-transporters must be Transport Quality Assurance (TQA) certified. The Extension Swine Specialist leads programs to allow producers to be trained and certified directly, and train-the-trainer programs to expand delivery of the programs. In addition a new swine management system is being introduced in Virginia, especially within the integrated swine operations in the state. This system, referred to as a wean-to-finish, requires specialized farm-to-farm transport of weanling pigs and specialized management practices for rearing of weanling pigs in larger pen facilities.

What has been done

Educational seminars were developed and delivered at multiple locations throughout the state to provide certification programs for PQA-Plus and TQA certification and individual sessions were held for new trainer certification. In addition a specific educational program was developed for the Virginia Pork Conference to provide training on tactics for successful implementation of the new wean-to-finish swine production system.

Results

Thirty one producers received certification or recertification in PQA-Plus training and fifteen producers received certification in TQA training. A regional veterinarian was certified as a new PQA-Plus producer trainer and an Extension Agent was certified as a new TQA trainer. In addition, 120 producers and swine industry people received training and education on the latest technologies in transporting and rearing pigs within the wean-to-finish management system. When implemented correctly, this system can provide for sound pig welfare while improving energy and cost efficiency on hog farms.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
315	Animal Welfare/Well-Being and Protection

Outcome #6

1. Outcome Measures

Number of youth adopting best practices related to animal agriculture through youth animal projects and events

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	32328

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Livestock projects (beef, sheep, swine, dairy, equine, and poultry) and educational events provide a vehicle for educating youth about the importance of animal agriculture to society and are instrumental in developing life skills in youth. Participation in youth livestock projects serves as a foundation for stimulating career choices in agriculture, and provides a vehicle for the dissemination of knowledge to the public.

What has been done

Training of youth occurs locally by Extension agents, volunteer 4-H leaders, and agriculture educators. State contests are coordinated by campus-based Extension specialist faculty with assistance from Extension agents, volunteers, and agriculture educators. Comprehensive competitions are held at the state level for youth age 9-19. In these events, youth are asked to evaluate animal quality, identify items, rank groups of items, perform calculations, and justify their decisions to others and to demonstrate their handling skills with their livestock projects. In 2011, the first Virginia Youth Livestock Leadership Forum was also held. This forum provided youth with hands-on workshops addressing antibiotic use, animal well-being, quality assurance, meat science, food safety and meat cookery.

Results

Youth participation in animal projects and embryology totaled 32,328 in 2011. 4,296 youth participated in state-level livestock and equine contests. The ability to observe and evaluate, ability to make decisions, and communication skills were enhanced by the students' participation in these events. The State 4H Horse Judging Team finished third at Southern Regionals, seventh at Youth QH Worlds, first at Arabian Nationals and second at Eastern Nationals. The state 4H Skillathon team finished second at the national contest. The state 4-H Livestock Judging team finished third at the national contest and will be representing the United States at the Royal Highland Show in Scotland. Youth livestock members showed and sold over 3000 project animals at the various show and sale events held throughout the state and received sales proceeds in excess of \$1.8 million.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
305	Animal Physiological Processes
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #7

1. Outcome Measures

Percent increase in sheep population in Southwest Virginia as a result of favorable lamb marketing arrangements

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Declining burley tobacco production has resulted in economic losses to local communities in Southwest Virginia. With a prime climate, suitable topography, and an abundance of forage the region is well suited for livestock production systems as an alternative to tobacco.

What has been done

Research and Extension efforts at the Southwest Agricultural Research and Extension Center demonstrated the profitability and utility of hair sheep in low-input, easy-care production systems. Results of this research have been disseminated throughout the state and region through field days, publications, and demonstrations and applied by local producers and producer marketing groups. Additionally, a new facility at the SW AREC had been constructed to facilitate applied research and education programs for sheep.

Results

Breeding sheep numbers in Virginia increased 10% in 2011 according to USDA. With the renewed interest in sheep, Virginia Cooperative Extension assisted local sheep producers with production and marketing endeavors. The first of its kind forage-based ram test for hair breeds is scheduled for 2012 at the Southwest AREC.

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
311	Animal Diseases

Outcome #8

1. Outcome Measures

Number of program participants acquiring knowledge on best management practices related to equine.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Between 2001 and 2006, there was a 26% increase in the number of horses in Virginia (215,000) which was accompanied by a 41% increase in horse operations to 41,000 (USDA/NASS 2006). In addition, the Virginia horse industry has an estimated \$1.2 billion impact on the state's economy, and horses are the 8th largest agricultural commodity in the Commonwealth. Also, Virginia horse owners spend \$926 million annually and support over 16,000 full-time jobs in the areas of racing, showing, recreation, breeding and other industry activities (Rephann, 2011). The total value of horse sales in 2006 was over \$107 million, with an average value of over \$6,800 per equine. Average annual expenditures per horse were estimated to be over \$3,600 in 2006 (USDA/NASS 2006) and over \$4,000 in 2010 (Rephann, 2011).

Many horse owners, whether new or experienced, are attempting to maintain their horses on their own property to try and decrease expenses and allow them more opportunity to enjoy time with their horses. Unfortunately, they often lack the necessary horse or pasture management experience to select appropriate feeds and health care products for their animals, to maximize forage production while minimizing the environmental impact of having horses on their small farm, or to be prepared for a variety of emergencies or disaster situations that could impact them.

What has been done

Across the state, over a dozen one-day programs and separate presentations addressing topics of pasture management were delivered at various Virginia Cooperative Extension, Agricultural Research and Extension Center, and horse industry events. Additionally, over a dozen on-site visits were conducted to discuss specific problems and issues of concern to farm owners. Speakers from academic institutions, veterinary practice, and horse industry professionals were invited in order to provide a wide variety of insight and experience. Presentations and discussions covered such topics as choosing hay alternatives in an economically challenged time; the economics of the hay industry for horse owners; evaluating hay and the hay market; equine forage issues and considerations for hay producers; general pasture management; large animal mortality composting, and health and feeding strategies for horses. Hands-on participation including identification of various species of fresh forage and hay; evaluation of quality based on visual inspection; taking forage samples and reading forage analysis results; comparison of visual inspection to actual hay test results; compost pile evaluation; and evaluation of horse health through body condition score, body weight estimation, and growth measurements.

Results

Over 1200 Virginians, including both youth and adult audiences, attended the various programs and presentations. One program in particular educated 105 high school students on large animal mortality composting and its application to the horse industry. In several cases, extension agents later conducted on-site farm visits with participants who took a more active interest in adopting best management practices at their operation. Finally, over 150 first responders, veterinarians, and horse owners were educated on emergency preparedness and disaster planning.

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 #9

1. Outcome Measures

Percent increase in freshwater shrimp production by Virginia farmers utilizing best management practices

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A sustainable alternative agriculture enterprise is needed to stimulate rural economic conditions in Southside Virginia.

What has been done

Best management guidelines were distributed to interested farmers. Site checks were conducted for new producers. Assistance was provided to a rebuilt nursery in addition to a second nursery established in Virginia. Six regional workshops and two field days were held to promote best management practices for shrimp farming. Assistance was provided during the labor intensive juvenile stocking period. Shrimp farm tours were conducted including annual Virginia Farm Bureau Aquaculture Commodity Meeting. Best Aquaculture Practices Education was provided to members of the Virginia AquaFarmers Network. Value-added alternatives to day-of-harvest sales were explored. Low-density pond production demonstration was conducted at Virginia State University's Randolph Farm. Media promoted shrimp farming. Extension support provided to two shrimp grant proposals. Furthermore, baseline value-added post-harvest processing techniques were developed and evaluated with a processor in Hampton, Virginia. This is a critical component to large-scale expansion of Virginia's shrimp industry, allowing for proper freezing of an otherwise perishable and seasonal product.

Results

Freshwater shrimp pond production continues to expand and has been shown to be a viable alternative agriculture operation stimulating rural economies throughout the Commonwealth. Target production for 2011 was: 400,000 juveniles stocked; >20,000 lbs produced; value = \$180,000. Actual results for 2011 were 400,000 juveniles produced and distributed primarily in the

tobacco growing counties of Southside VA; 14,500 lbs harvested; approximately 50% sold at an average price of \$9.50/lb for a total value of \$76,000; remainder frozen and processed before IQF and future sale during months until next harvest. Gross revenue from sales of frozen shrimp is estimated at \$140,000. Growth is expected next year as operations expand and new producers start pond construction. Two grant proposals were funded. Furthermore, post-harvest value-added freezing trials were conducted with excellent results. Ongoing product quality sensory and food safety analyses are being conducted over time to verify shelf-life.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
311	Animal Diseases

Outcome #10

1. Outcome Measures

Percent increase in sales of pond raised fish due to adoption of best management practices.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	25

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Adopting best management practices (BMP) for fish production will increase production level, protect aquatic environments and reduce losses due to poor water quality and diseases. Fish farmers and the Virginia AquaFarmers Network (VAN) are in need of adopting BMPs. VAN wants BMPs as part of their overall production strategy to make their organization successful.

What has been done

A list of preliminary BMPs for catfish production was given to VAN for their review and possible acceptance. Seven workshops were given that covered BMPs in pond production, transportation and processing of fish (Catfish). These workshops also covered feed management, water quality

and fish health. Technical Assistance was provided for live fish transport for sales

Results

VAN and other fish farmers have developed new markets for processed and live fish sales, especially for stocking pond and lakes with many in urban fishery zones. Live fish represented around 50% of sales for catfish farmers. Farmers have increase stocking by more than 30% to meet previous year demand. VAN have now selling in Farmers Markets (Charlottesville and Williamsburg). This has resulted in a 25% increase in Catfish sales. Three workshops are planned for 2011 to increase farmer's awareness of BMPs especially water quality, for fish farming. By adopting best management practices (BMP), fish production. Fish farmers and the Virginia AquaFarmers Network (VAN) are in need of adopting BMPs. VAN wants BMPs as part of their overall production strategy to make their organization successful.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)

Outcome #11

1. Outcome Measures

Increased fish production via recirculating aquaculture system (RAS) and pond production techniques through innovative research and dissemination and application of results through VCE programming to producers.

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
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Aquaculture is, and has been the fastest growing sector of agriculture in the US for the past decade. Aquaculture has the potential to reduce our current 10 billion dollar national seafood

trade deficit, enhance domestic seafood quality and safety, and can do so concurrently with revitalizing America's rural agriculture sectors and coastal fishing communities.

What has been done

In Virginia, Extension faculty from VT and VSU have worked cooperatively to expand Virginia's aquaculture production sector. This has been accomplished through numerous technical, marketing, value-added, Good Aquaculture Practice and subject-specific extension workshops, as well as field and technical onsite support at the producer level and faculty participation in producer grant submissions. Furthermore, industry requested research towards enhanced freshwater and marine shrimp and catfish production, identifying emerging marine species' biological and environmental optimization requirements, and production system optimization was conducted by VSU and VT Extension faculty and research facilities.

Results

In 2011, Virginia's finfish and crustacean production sectors increased by over \$300,000. These increases included expanded pond and RAS production of marine and freshwater shrimp, marine finfish such as Spot, Black Sea Bass, and Flounder, and freshwater finfish including Hybrid Striped Bass and Tilapia. These expansion efforts continue into 2012, with major emphasis upon serving new aquaculture producer start-ups. New producers with fish already in production are expected in 2012 to exceed the \$300,000 increases for 2011.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #12

1. Outcome Measures

Number of individuals who gain knowledge to improve small ruminant production.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	800

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small ruminants (sheep and goats) are a relevant component of rural economies in Virginia, with over 5,000 farms (>10%) having small ruminants as a part of their livestock enterprise.

What has been done

Many small ruminant farmers have livestock enterprises as a secondary income, or are new to the business. Therefore, there is a strong need for fundamental education which provides basic skills related to animal management, marketing, and business principles.

Results

In 2011, Virginia Cooperative Extension reached over 800 small ruminant producers through various educational workshops, field days, and activities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #13

1. Outcome Measures

Introduction of cage aquaculture systems for Virginia farm ponds.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The use of cages for growing fish is a viable aquaculture method for owners of farm ponds. Participants were exposed to cage aquaculture production methods. All participants learn how to build cages for growing fish by actually making one from provided materials.

What has been done

Participants learned the skills needed for building fish cages and growing fish in them.

Results

Participants built ten cages for use in their ponds. This adaptation of cage aquaculture in Virginia allows for local farm sales of fish to the local market.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #14

1. Outcome Measures

"Fish School" enhances small-scale aquaculture production.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is a growing interest in small-scale aquaculture production.

What has been done

Learning experiences are enhanced by combining lectures with practical hands-on activities. Aquafarmers, individuals with an interest in diversifying agriculture enterprises by adding aquaculture, school teachers and others participated in a 3-day educational program. Multiple species were covered in addition to pond, cage and greenhouse tank production.

Results

"Fish School" participants successfully adopted the best management practices learned. Increased freshwater shrimp and catfish production by Virginia aquafarmers allowed the establishment of a sufficient supply to fulfill local community based food group orders, and supply demand at farmers markets and other niche outlets.

4. Associated Knowledge Areas

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

Outcome #15

1. Outcome Measures

Small Ruminant Production and Marketing in Virginia.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to Census of Agriculture data, Virginia sheep and goat market value has increased 28% (2002-07). On a percentage basis, this makes it the third largest increasing value for Virginian agriculture commodities. An in-depth survey of farming practices was conducted through phone interviews of about 100 Virginia small ruminant producers. The survey attempted to identify critical issues facing small ruminant producers.

What has been done

When analyzed the most limiting issues to established producers were control of gastrointestinal nematodes and cost of nutrition. Realizing that the growing industry would also have an influx of new or untrained producers, a need for introductory educational programs was also identified. This prompted the development, initial limited scale, of panels of select producers working as a participatory group to investigate and develop programs to address group identified critical issues.

Results

Programs are being designed to meet the needs specifically identified in the survey and to reach start up producers. In terms of limiting issues, Virginia Cooperative Extension continues to reach more producers with programs specifically designed to assist producers in controlling gastrointestinal nematodes. To date we have educated over 500 people with hands-on applied training programs, which is twice what any other state has reported.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
313	Internal Parasites in Animals

Outcome #16

1. Outcome Measures

Chesterfield Technology Center and Appomattox High School Veterinary Sciences Program Partnership.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Today students desiring careers in veterinary science frequently lack farm background and are finding it increasing difficult to obtain the desired balance of academic rigor and practical experience desired by colleges, veterinary schools and veterinary clinics.

What has been done

As the Veterinary Sciences program at the Chesterfield Technology Center (CCT) developed, we worked to develop a supplemental curriculum that would both engage and challenge students. A significant component of this curriculum is a partnership that integrates the Virginia Cooperative Extension and regional small ruminant producers into student (and producer) education. Students learn basic management techniques and contribute to applied on-farm research. Producers and students learn basic laboratory techniques and contribute to applied research data collection. Research results from this partnership contribute to updating the small ruminant database, which is a primary source of current research for Extension outreach programs. This year we expanded the program to include the Animal Science students at Appomattox High School.

Results

The Veterinary Science program has become one of the most competitive programs for enrollment at the Chesterfield Technology Center. Overall students are better prepared and more inclined to continue education, primary at Virginia's land grant schools. Producers also learn

basic laboratory techniques and gain a detailed farm report. The data collection process introduces the students to applied research and the results are published in abstracts and papers. In an age where youth education is often disengaged, the students enthusiastically learn in this environment. When returning from the on-farm training this past fall, one of the students shouted to roaring applause "This is the best field trip ever?". The data collected contributed to a poster presentation at the World Association for the Advancement of Veterinary Parasitology meetings.

4. Associated Knowledge Areas

KA Code	Knowledge Area
313	Internal Parasites in Animals
315	Animal Welfare/Well-Being and Protection

Outcome #17

1. Outcome Measures

Anthelmintic Resistance and Usage by Small Ruminant Producers.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The small ruminant industry is one of the most rapidly growing agricultural industry in Virginia. According to Census of Agriculture data, Virginia sheep and goat market value has increased 28% (2002-07). On a percentage basis, this makes it the third largest increasing value for Virginian agriculture commodities.

What has been done

By surveying current Virginia small ruminant producers, control of gastrointestinal nematodes has been identified as their most limiting and critical issues. Control is confounded by several key issues; principle to these is anthelmintic resistance and lack of experimental data on epidemiologically basic alternative methods.

Results

For the past seven years, we have been documenting anthelmintic usage and resistance on Virginia's small farms. This past year, we continued to compile data that enabled us to estimate the status of anthelmintic resistance to all modern anthelmintic on a representative subset of 20 of these farms. We are currently updating information from our full survey base of about 100 farms and using this information to develop alternative management practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
313	Internal Parasites in Animals

Outcome #18

1. Outcome Measures

Accelerated Mating with Hair Sheep

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There has been a dramatic increase in the nontraditional lamb market, which now represents 48% of the 2.5 million lambs slaughtered annually. Hair sheep are well-suited to supply the ethnic, specialty, and niche markets now becoming more dominant. While the number of sheep declined by 0.5 million over the past 5 years, the number of farms increased by approximately 10,000 during this period. This shift towards more small scale and low-input operations favors easy-care characteristics found in hair sheep. Seasonal breeding of sheep in temperate environments limits production. Increasing the frequency of lambing and shifting towards year-round production, utilizes facilities and labor more effectively, and takes advantage of favorable markets.

What has been done

Flocks of the Katahdin, Barbados Blackbelly and St. Croix hair sheep were established on Virginia State University's Randolph Farm to evaluate the comparative performance of the breeds in forage-based production systems. The sheep were mated in 8-month intervals, rather than annually to evaluate their suitability for an accelerated mating system in a mid-Atlantic environment. Ewes were exposed to rams of like breed in single-sire mating groups in

November, July and March. Mating periods were selected to avoid breeding ewes during periods of deep seasonal anestrus (April through June). Ewes lambled unassisted on pasture, and lambs were weaned at 2 months of age. Data were collected over two production cycles (4 years).

Results

Pregnancy and lambing rates were higher for all breeds following November mating (>90%) during the peak of seasonal breeding, but also exceeded 80% in the other two mating periods (July and March). Pre-natal losses were limited (0-2%) except in Katahdin in the first July mating period (12%). The accelerated mating system produced an annual lamb crop of 2.36-2.77 lambs/ewe lambing depending on breed, with a production efficiency of 62-63% (weight of litter weaned as percentage ewe body weight). This represents an increase of 28-38% in annual lamb crop, and 20-22% increase in production efficiency compared to a once annual November mating. Production efficiency also increased from 43.1 to 47.0% from the first to the second two year cycle, suggesting no negative long-term effects of accelerated mating on ewe productivity. Data suggest that hair sheep are well-suited for accelerated mating under mid-Atlantic conditions, and can form the basis for a system of year-round production of lambs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals

Outcome #19

1. Outcome Measures

Energetic Cost of Gastrointestinal Nematode Parasites in Sheep and Goats

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The small ruminant industry is threatened by parasitic nematode populations (*Haemonchus contortus*) that have become increasingly resistant to drugs. In the southeastern U.S., this nematode represented 75-80% of the total fecal nematode egg output and worm burden. This has led to a search for alternate means of combating this most detrimental nematode accounting for health and economic losses.

What has been done

The small Ruminant Meat Goat Research Program at Virginia State University is in the process of evaluating effects of the nematode parasite (*Haemonchus contortus*) on nutrition, clinical parameters, and parasite-nutrition interaction by determining the effects of artificially infecting sheep and goats. Representative numbers of experimental animals were harvested at the beginning and end of the experiment for determining metabolizable energy content. Feed Consumption, body weight loss or gain, FAMACHA, Fecal Egg Count, and Packed Cell Volume were recorded throughout the duration of the experiment after the animals were infected with the infective stage larvae (L3) thrice per week for both meat goats and hair sheep.

Results

Infection with the gastrointestinal nematode parasite (*Haemonchus contortus*) affected live weight gain and feed consumption. Parasite nutrition interaction influenced the animal's ability to limit larval establishment (resistance) and also its ability to function and maintain normal productivity in the face of larval challenge (resilience). Because small ruminants get the larvae while grazing on pasture, pasture management practices that minimize contact of animals with the larvae, coupled with nutrition and feeding programs that ameliorate the problem, may be important for improved production and productivity.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Government Regulations
- Competing Programmatic Challenges

Brief Explanation

Specific external factors have impacted the state defined outcomes, in particular those related to the livestock sector. A combination of high input costs and other economic factors have resulted in a decrease in cattle numbers similar to other regions of the country. Outcomes measures based on quantification statistics are impacted by number of cattle and number of producers raising cattle accordingly.

Additionally, increased focus on issues surrounding the environment and regulatory items with the Chesapeake Bay Watershed have shifted local programming in some instances away from outcomes measured in Animal/Animal Products to those more appropriately measured in Ag Systems and/or Climate Change/Natural Resources.

Budget reductions over last few years to VCE system continues to impact the Animal area through reduced number of local agents. Reduction in quantity of field staff is coupled with reduction in personnel experience, and more demand on individual agent's time from other program areas (less opportunity to focus).

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Global Food Security and Hunger - Agricultural Management, Marketing and Policy

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
601	Economics of Agricultural Production and Farm Management	25%	20%	15%	0%
602	Business Management, Finance, and Taxation	20%	20%	15%	0%
603	Market Economics	10%	30%	15%	0%
604	Marketing and Distribution Practices	10%	30%	15%	0%
605	Natural Resource and Environmental Economics	25%	0%	25%	0%
610	Domestic Policy Analysis	10%	0%	15%	0%
	Total	100%	100%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Actual Paid Professional	0.1	1.0	0.1	0.0
Actual Volunteer	137.0	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
154183	158742	295125	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
511110	172769	850121	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1293868	0	3424321	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research and educational programs will be conducted to support the needs of Virginians and Virginia farm and small business managers. Financial research will be conducted to develop knowledge of production and market systems. 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

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

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	18797	27222	3374	834

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	3	6	9

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of farmers creating succession/transition plans for their farm business

Year	Actual
2011	125

Output #2

Output Measure

- Number of education programs conducted in farm and agribusiness management and risk management

Year	Actual
2011	30

Output #3

Output Measure

- Number of education programs conducted in marketing and direct marketing

Year	Actual
2011	30

Output #4

Output Measure

- Published "Planning the Future of Your Farm A Workbook Supporting Farm Transfer Decisions, Virginia Edition at http://pubs.ext.vt.edu/446/446-610/446-610_pdf.pdf a 114 page

Year	Actual
2011	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase the number of land owners who implement transition plans.
2	Increase the number of program participants (farmers, agricultural business managers and leaders, food processors, government agencies, and agribusiness firms) making more informed business and economic decisions.
3	Increasing Virginia Aquaculture Profitability through Community Supported Fisheries Development
4	Increasing Small Farm Profitability through Collaborative Market Networks
5	Creating Effective and Legal Food Labels for Virginia Small Food Businesses

Outcome #1

1. Outcome Measures

Increase the number of land owners who implement transition plans.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Agricultural producers have ever increasing assets to protect and almost constantly changing laws to keep up with when it comes to planning the distribution of their estates. Communication of options with those involved can be a daunting task, especially when one isn't fully confident of the exact content and options that need to be discussed. Unfortunately, many farm estates get left in the hands of the courts where significant portions get lost to the government ?who has a plan for you? should you succumb without provisions

What has been done

The Farm Transition program was held on 2 consecutive Tuesdays in February, 2011, utilizing local professionals and Va. Tech Extension Agents who offered their insights and expertise on the issues involved in estate planning. Thirty-two people attended from 18 operations.

Results

Initial evaluations yielded a 100% rate of satisfaction. Evaluation comments and responses also indicated that as many as 80% felt more prepared to make prudent decisions and to go forward with implementing the planning process.

Eleven months later, a follow-up survey was conducted and 10 of the 18 operations reported that they had completed or made significant progress on implementing their plans. Significant meaning "having more than five of ten steps of implementation accomplished". Of the remaining operations, 3 had started and accomplished at least 2 of the steps with only 1 not doing anything. They also reported 100% use of local attorneys, accountants and other professionals. Participants reported an average use of 85% of the material covered in making their decisions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

Outcome #2

1. Outcome Measures

Increase the number of program participants (farmers, agricultural business managers and leaders, food processors, government agencies, and agribusiness firms) making more informed business and economic decisions.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	145

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Relevance: Virginia's agricultural and forest products exports in 2010 were valued at \$2.3 billion. This is a major contributor to the economic well being of all Virginians?.

What has been done

Response: Many farmers, land owners, and government officials consider trade to be at a level outside of their sphere of concerns or influence. A workshop was conducted to improve the knowledge of entrepreneurs, educators, policy makers, and government officials on: 1) importance of trade, 2) develop opportunities to increase farm and industry income and jobs through larger exports, 3) understanding Virginia's role in the global market place, 4) understanding our trading partners and competitors, and 4) panels of successful exporters small and large scale.

Results

Results: Approximately 145 individuals attended the workshop and included a broad spectrum of individuals from farmers to CEO's of Fortune 500 companies. Feedback from the workshops were overwhelmingly positive. Written comment reinforced a very successful workshops including, "future of Agriculture looks good and there are opportunities: Even in uncertain times, and Bob Thompson's presentation on trade was one of the best presentations I have heard in years." Evaluations indicate that the main reason people attend are to: Hear internationally

known speakers on trade and policy, to be more informed on current issues and projection of the future of agriculture, understand and identify opportunities for exporting, and network with speakers and participants. Other written comments: ?Will recommend it to my business associates, ?An amazing set of speakers? and ?The Australian?s presentation needs to be heard by all American farmers.? Maybe the most important result is, this conference clearly demonstrates that state agencies, NGO?s, and Universities can plan and delivery world-class workshops, they are VDACS, Virginia Farm Bureau, Virginia Port Authority and the Department of Agricultural and Applied Economics.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
610	Domestic Policy Analysis

Outcome #3

1. Outcome Measures

Increasing Virginia Aquaculture Profitability through Community Supported Fisheries Development

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to the U.S. Department of Agriculture, 2007 Census of Agriculture, (February 2009) from 1997 to 2007, small family tobacco farms (less than 50 acres) have decreased over 90 percent from 1997 (1,920 farms) to 2007 (181 farms). Smaller tobacco farms have diversified into aquaculture enterprises as a tobacco crop alternative selling their products to wholesale and retail outlets. However, these marketing avenues are not as lucrative, or risk averse as developing another marketing channel called Community Supported Fishery (CSF) Subscription Sales. CSF is a reliable income source because it is a pre-payment system that builds a loyal customer base. CSF can help replace the tobacco income for smaller acreage farms.

What has been done

In early 2011, University of Virginia students requested technical assistance in developing a marketing business related to CSF. The VSU marketing and agribusiness specialist connected them to Virginia Aqua-Farmers Network (VAN). VAN is a Virginia based cooperative of 25 member/owner aqua-farmers producing and marketing farm-raised, chemical-free, sustainable channel catfish, rainbow trout, hybrid striped bass, and freshwater prawns. Extension based technical assistance was provided in business tax structure, business and marketing plan development, and marketing promotion (website and brochure: <http://cvillecsf.com/contact/>).

Results

Documented first year gross profits for the Charlottesville CSF was \$10,800. 2012 plans are to increase membership volume and explore additional delivery locations.

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices

Outcome #4

1. Outcome Measures

Increasing Small Farm Profitability through Collaborative Market Networks

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Over the last five years, the value of farm products sold directly to individuals for human consumption has increased from \$16,825,000 to \$28,878,000 (U. S. Department of Agriculture, 2009). Lack of resources and experience prevent small and beginning farm businesses from effectively capitalizing from the increasing market demand for locally grown farm products nationally (National Farm Family Coalition, 2011). Food retailers and distributors recognize consumer demand for locally sourced foods and desire to increase purchasing volumes (Zajfen, 2008). However, multiple buying transactions with individual farms is too time-consuming for food

industry buyers to manage (Day-Farnworth, McCown, Miller, & Pfeiffer, 2009). Market opportunities exist for small farms to market collaboratively to meet the demands of food retailers and distributors (Dreier & Taheri, 2008). Establishing sustainable collaborative marketing arrangements between small and beginning farm businesses and the food industry potentially increases the survival rate of small and beginning farms.

What has been done

To address this issue, direct technical assistance was provided to individuals seeking to develop collaborative marketing networks on the following business topics: Incorporation, e-commerce, website development, business and marketing plans, CSA structure, and farmer recruitment.

Results

Three collaborative marketing networks were developed: Patchwork Farm Cooperative (Bumpass, VA-<http://www.localfoodmarketplace.com/patchwork/Default.aspx>), Charlottesville CSF (Charlottesville, VA-<http://cvillecsf.com/>), and The Farm Table (Richmond, VA-<http://www.thefarmtable.org/home>). In collaboration with Five Points Community Farm Market <http://www.5ptsfarmmarket.org/home/> (Norfolk, VA) a Farmer's Expo was conducted to educate and recruit farmers for 2012 retail season). Participating producers reported a combined total of \$70,700 of additional farm income after learning about and participating in collaborative farm marketing networks.

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices

Outcome #5

1. Outcome Measures

Creating Effective and Legal Food Labels for Virginia Small Food Businesses

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Developing value added food products are a source of small business profitability in Virginia. Lack of understanding on national and state regulations guiding legal food labeling deters many beginning food businesses. Low marketing budgets prevents small start-up food businesses from creating professional labels necessary for increased profitability.

What has been done

In order to address this need, Virginia State University marketing and agribusiness specialist was approached by the Prince Edward Cannery and the Longwood Small Business Center to develop curriculum and a website to assist interested food entrepreneurs to understand food labeling regulations and to learn how to create their food labels. Technical guidance from VDACS Food Safety Division was sought and provided.

Results

In collaboration with VDACS food safety inspector, curriculum and a website <https://sites.google.com/site/foodlabelclass/> was developed. The webpage serves to educate interested small food businesses on the following topics: (a) how to make a simple label in MSWord, (b) Virginia and federal label guidelines, (c) Virginia food regulation contacts, and (d) how to start a food business in Virginia. To date, 37 Virginia small food businesses have created food labels for their products, and 1,392 webpage visits have taken place. Class participants who created their food labels reported a minimum of \$150, and a maximum of \$10,000 increase in gross sales. Total reported income increase was \$17,500.00.

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Global Food Security and Hunger - Biotechnology and Genomics

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
135	Aquatic and Terrestrial Wildlife	0%	0%	15%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	50%	0%	70%	100%
304	Animal Genome	50%	0%	15%	0%
	Total	100%	0%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890

Actual Paid Professional	23.6	0.0	25.4	1.0
Actual Volunteer	2.0	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
249642	0	477846	251544
1862 Matching	1890 Matching	1862 Matching	1890 Matching
827554	0	1376455	276258
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2094939	0	5544418	1482

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

Research scientists, government officials, high school teachers, interested public

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4	1	0	0

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	1	5	6

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of biotechnology and genomics research projects in program areas

Year	Actual
2011	4

Output #2

Output Measure

- Number of peer reviewed biotechnology and genomics research papers published

Year	Actual
2011	5

Output #3

Output Measure

- Number of biotechnology and genomics presentations

Year	Actual
2011	13

Output #4

Output Measure

- Number of non-peer-reviewed biotechnology and genomics publications

Year	Actual
2011	6

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of projects addressing genetic improvement of aquaculture stocks
2	Number of projects to reduce impact of biotic and abiotic factors on food security
3	Number of projects to improve quality of food crop plants through genetic and metabolomic research
4	The science and regulation of food from genetically engineered animals.
5	Genomics of freshwater mussels
6	Genetic regulation of wood formation

Outcome #1

1. Outcome Measures

Number of projects addressing genetic improvement of aquaculture stocks

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of projects to reduce impact of biotic and abiotic factors on food security

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Number of projects to improve quality of food crop plants through genetic and metabolomic research

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Endodormancy is a hallmark of woody perennial plants of the temperate and boreal regions that enables above ground meristems to survive the freezing and dehydration stresses of winter. Forest tree populations are well adapted to their local environments at present, but climate change is substantially altering adaptive landscapes, and is expected to lead to widespread maladaptation of tree populations to their seasonal temperature regimes. Adapting management strategies to account for these changes depends crucially on an understanding of the genomic architecture of adaptive traits. By integrating molecular biology, bioinformatics, and population genomics, this project will substantially advance this goal.

What has been done

This project takes a population genomics approach to dissect the genomic basis for endodormancy transitions and cold hardiness in *Populus*. A recently developed technology for genome complexity reduction will allow us to pursue this goal on a genome-wide scale, and collaboration with groups working in related poplar species will facilitate comparative analysis of adaptation. Sequence capture technology will be employed to retrieve exons and upstream regulatory sequences for all expressed genes in *Populus trichocarpa* (black cottonwood), and captured targets will be sequenced in a large black cottonwood mapping population that spans most of the species range. Genotype-phenotype associations will be sought with three phenotypic traits, namely, timing of budset, timing of budflush, and cold hardiness. Associations will also be sought with climate variables that represent the principle selective constraint related to these traits. Positive associations will be validated in a separate cohort of poplar clones, and using data provided by collaborators, the extent of overlap in adaptive loci in both *Populus tremuloides* (trembling aspen) and *Populus deltoides* (eastern cottonwood) will be determined.

Results

As this project was recently funded by NSF (start date: Feb 1), we are currently in the process of developing the common garden in southside VA and in British Columbia, Canada, as well as recruiting a highly qualified postdoctoral researcher and doctoral student.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

The science and regulation of food from genetically engineered animals.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With advances in gene transfer techniques comes the prospect of producing genetically improved lines, for example, fast-growing Atlantic salmon; pigs and tilapia fish with enhanced ability to utilize soybean meal while reducing phosphorus excretion; and catfish and carp with enhanced resistance to bacterial diseases. However, no genetically engineered animal intended for use as food by humans has yet received regulatory approval. There are controversies regarding food safety, animal welfare, and environmental safety of animals produced through biotechnology; depending on the application, some of these issues are well based in science; others are not. Because of these controversies, there is considerable uncertainty about gaining regulatory approval for commercialization of animals produced through biotechnology. Sustainable application of genetic engineering of animals will require careful oversight and commercialization, as well as communication on the part of regulators, the food industry, and other stakeholders. It is a pivotal moment for possible commercialization of animal biotechnology ? a regulatory decision on the first application for a genetically engineered animal for food ? the fast-growing Atlantic salmon? is currently before the Food and Drug Administration, but Congress may thwart science-based regulatory oversight with a bill prohibiting any FDA funds from being used to approve the fast-growing salmon. The outcome of conflict between the legislative and regulatory branches of the government may have implications not just for that product, but more broadly for animals

produced through biotechnology.

What has been done

Two colleagues and I wrote a non-partisan review of these technical and regulatory issues. Over the past year, I have made three presentations to biotechnology, legislative, or regulatory groups in Washington, DC and four in Norway.

Results

Following publication of our review, I was interviewed and quoted in the popular and technical press. The opportunity to make presentations in Norway, for which I was recruited and my expenses covered by the U.S. Embassy there, followed from the presentations in Washington, DC. Questions received at or after presentations made clear that listeners had come to understand more deeply the issues pertaining to animal biotechnology.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #5

1. Outcome Measures

Genomics of freshwater mussels

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Freshwater mussels constitute one of the most sensitive and rapidly declining faunal groups in the world. Little is known about physiology of freshwater mussels, impeding conservation efforts; in particular, knowledge of genes mediating adaptation and conferring resiliency in the face of ecological challenge is scant.

What has been done

We sequenced the transcriptomes, i.e., the collection of expressed genes, of dwarf wedgemussel

(*Alasmidonta heterodon*), brook floater (*Alasmidonta varicosa*), and eastern elliptio (*Elliptio complanata*). We assembled contiguous sequences, identified expressed sequence tags (ESTs), and described microsatellite loci for each of the three genomes. A total of 818 open reading frames (ORFs) were identified for *Alasmidonta heterodon*, 1390 for *Alasmidonta varicosa* and 1282 for *Elliptio complanata*. These data were deposited in the GenBank database. Estimated transcriptome sizes were 66.9 Mb for *A. heterodon*, 76.9 Mb for *A. varicosa*, and 74.6 Mb for *E. complanata*. Only 12-18% of the transcript sequences could be rigorously annotated, results similar to those of Bai et al. (2009) for freshwater pearl mussel *Hyriopsis cumingi*. Single nucleotide polymorphisms (SNPs) among species totaled 11,239, with 341 within *A. heterodon*, 738 within *A. varicosa*, and 444 within *E. complanata*. For genes where we have homologous sequences for all three transcriptomes, we are assessing phylogenetic variability and applying tests of selective neutrality to identify sequences subject to natural selection. We found 252 microsatellite DNA-bearing loci in *A. heterodon*, 440 in *A. varicosa*, and 569 in *E. complanata*; a subset of these candidate marker loci will prove useful for population genetic studies to inform conservation planning.

Results

The genomic information gained in this ongoing study and in follow-up studies will prove useful in advancing understanding adaptation in freshwater mussels.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #6

1. Outcome Measures

Genetic regulation of wood formation

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Lignin and cellulose represent an abundant, renewable source of building blocks for biomaterials and of fermentable sugars for ethanol production, respectively. However, the natural composite of

these two polymers, wood, is recalcitrant to chemical breakdown, and genetic manipulation of the wood formation pathway has the potential provide a more amenable starting material (e.g., with more or less lignin, different structural properties, etc.) for biofuel and biomaterial applications.

What has been done

The goal of the current project is to better understand the genetic regulatory networks governing wood formation to identify novel targets for genetic manipulation. To do this, transcriptional networks are being developed using both published and unpublished transcriptome data relevant to wood forming tissues. Pairwise correlations of gene expression across >10 available treatment conditions were estimated and the resulting gene expression patterns clustered using weighted gene co-expression network analysis (WGCNA). To better understand the biological role of each cluster, statistically overrepresented Gene Ontology terms were identified.

Results

Nineteen highly correlated clusters were identified. To find xylem related genes, we compared the genes in each cluster with those upregulated in xylem relative to phloem tissue, and found that 84% of the one particular cluster is represented by these genes. So one can conclude, black cluster is somehow related with xylem formation. Numerous Gene Ontology categories suggestive of involvement in wood development (e.g., coumarin biosynthesis, lignin biosynthesis, phenylpropanoid metabolism) were overrepresented among the transcripts in this cluster. Future work will focus on functional characterization of genes within this cluster that are not yet annotated, which may provide novel targets for genetic tailoring of the xylem to particular end uses.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Public Policy changes

Brief Explanation

FDA is about to determine whether genetically-modified salmon can go into pilot-scale production. FDA, the Department of State and Congressional input have asked for expert input.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 11

1. Name of the Planned Program

Global Food Security and Hunger - Family Nutrition 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
704	Nutrition and Hunger in the Population	100%	100%	100%	0%
	Total	100%	100%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890

Actual Paid Professional	3.8	2.0	4.1	0.0
Actual Volunteer	6609.0	42.0	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
135223	0	258833	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
448258	70525	745580	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1134759	120724	3003226	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Family Nutrition Program which is comprised of two nutrition education programs are funded by USDA, NIFA and FNS. The Expanded Food and Nutrition Education Program (EFNEP) and the Supplemental Nutrition Assistance Program-Education (SNAP-Ed) are nutrition education programs targeting impoverished citizens of Virginia. Our goal is to teach good nutrition practices, how to stretch their

food dollars and SNAP benefits, incorporate physical activity into their daily lives, and prevent chronic diseases related to poor dietary habits and inactivity.

2. Brief description of the target audience

The target population for EFNEP and SNAP-Ed are people who receive SNAP benefits (formerly food stamps), are eligible for SNAP benefits but do not receive them, and participate in the Supplemental Nutrition Education Program for Women, Infants, and Children.

The children we work with are in schools, after school programs, and summer food service feeding sites. These children are eligible for the National School Lunch Program (NSLP). They dwell in households at or below the federal poverty line.

The adults of the Family Nutrition Program can be the parents of children who qualify for NSLP. Adults are also reached in court appointed parenting classes, community center gatherings, and community - based senior groups.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	156135	702	630091	118

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of sites where programming was delivered.

Year	Actual
2011	4945

Output #2

Output Measure

- Increase the number of adult participants who report that they run out of food less often after participating in the Family Nutrition Program.

Year	Actual
2011	2276

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase the number of adult participants who report that they ran out of food less often after participating in the Family Nutrition Program.
2	Expanded Food and Nutrition Education Program (EFNEP) Promotes Positive Health Behavior Change
3	Nutrition Education in the Classroom: Collaborator Volunteer Teachers Extend the Reach of the Family Nutrition Program and Combat Childhood Obesity
4	Supplemental Nutrition Assistance Program-Education (SNAP-Ed) Addresses Obesity and Overweight through Nutrition Education
5	The Expanded Food and Nutrition Education Program (EFNEP) and the Supplemental Nutrition Assistance Education Program (SNAP-Ed) Reduces Health Care Costs in Virginia

Outcome #1

1. Outcome Measures

Increase the number of adult participants who report that they ran out of food less often after participating in the Family Nutrition Program.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	2276

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Map the Gap reports 11.8% of Virginians are food insecure. When a household is in a period of food insecurity, they are likely to make food budget adjustments, reduce food intake, and change to foods that are not nutrient-dense. Research supports a relationship between being overweight and obese and food insecurity. About 55% of households living at 130% of the federal poverty level who receive SNAP benefits for 12 months are still food insecure by the end of the month.

What has been done

The Family Nutrition Program uses a core lesson series addressing food insecurity through planning meals, shopping and buying food, food safety, preparing meals at home, gardening and appropriate food preservation as well as raising awareness of community resources to meet food security issues. A concerted effort to work with Farmer's Markets is under way statewide.

Results

As a result of the nutrition education program, 35% of our families (2276 participants) graduated from the program (6519 participants) less often ran out of food after completing the Family Nutrition Program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
704	Nutrition and Hunger in the Population

Outcome #2

1. Outcome Measures

Expanded Food and Nutrition Education Program (EFNEP) Promotes Positive Health Behavior Change

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The rate of obesity in the U.S. is higher than ever before and 17% of American children bear the burden of obesity. The highest rates of obesity incidence are within low income populations. Poor and compromised health status and low income has significant emotional, physical, and spiritual implications. Educational programs are essential to changing the chronic disease status of this population.

What has been done

In 2011, the EFNEP enrolled 20,368 low income youth and 2,073 low income adults whose incomes were equal to or less than 185% of Federal poverty guidelines. Through a six week lesson series, participants learned to select, buy, prepare, store foods and prepare nutrient dense foods to meet their nutritional needs, while operating within sound budgets and gaining organizational skills.

Results

Pre and post program measures reported: 75% of adults showed improvement in food resource management practices, 81% showed improvement in one or more nutrition practices, 61% demonstrated acceptable food safety practices, 35% less often ran out of food by the end of the month upon completion of the program.

Youth reported: 78% now eat a variety of foods, 88% increased knowledge of essentials of human nutrition, 84% increased their ability to select low-cost, nutritious foods, and 91% improved practices in food preparation and safety.

4. Associated Knowledge Areas

KA Code	Knowledge Area
704	Nutrition and Hunger in the Population

Outcome #3

1. Outcome Measures

Nutrition Education in the Classroom: Collaborator Volunteer Teachers Extend the Reach of the Family Nutrition Program and Combat Childhood Obesity

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2010, Virginia had a 26.4% obesity rate and one in three children continue to be overweight or obese. Results of the Virginia Childhood Obesity Survey report revealed that the Southwest Region had the highest obesity rate for children 10-14 years of age, followed by Southeast Virginia (24%). Survey results revealed: Low income youth are more likely to be overweight or obese.

What has been done

Engaging teacher volunteers to reach diverse families by including nutrition education in the schools which are 50% or greater Free and Reduced Lunch is the most recent strategy employed by the Expanded Food and Nutrition Education Program and Supplemental Nutrition Assistance Program-Education. Teacher volunteers are recruited and trained in youth nutrition curriculum and teach six hours of nutrition education to the youth. Parents receive newsletters that educate them to what their children are learning in the classroom.

Results

In 2011, 1075 volunteers dedicated 12,917 hours teaching 12,123 participants direct nutrition information. In addition, another 17,156 limited resource families were reached through indirect means with nutrition education. Post-lesson surveys reported on the youth outcomes: 86.7% showed improvement in eating more fruits and vegetables and 85.9% showed improvement in extending their physical activities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
704	Nutrition and Hunger in the Population

Outcome #4

1. Outcome Measures

Supplemental Nutrition Assistance Program-Education (SNAP-Ed)Addresses Obesity and Overweight through Nutrition Education

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Overweight and obesity are major health and economic issues, costing Americans approximately \$147 billion each year, based on 2008 dollars. Likewise, an obese person has annual medical costs that are \$1,429 more than their normal weight counterpart. Almost 34% of adults and 17% of children and adolescents ages 2-19 are obese. Accordingly, the latest Behavior Risk Factor Surveillance System, 26% of all Virginians are obese. Families of low-socioeconomic status suffer disproportionately from poor health.

What has been done

Virginia Cooperative Extension's SNAP-Ed reached 108,896 low income participants with 302,115 contacts whose income was equal to or below 150% of Federal poverty guidelines. Participants learned to select, buy, prepare, and store foods to meet the nutritional needs of their families, while operating within sound budget constraints, and developing organizational skills.

Results

It can be assumed that chronic diseases are either being prevented and or delayed due to pre-post program measures of adults participating in SNAP-Ed. Data from adults reported that 7,675 adults changed their behavior in: 75% reported improvement in one or more food resource management practices, 81% reported improvement in one or more nutrition practices, 56% demonstrated acceptable food safety practices. Data on 28,540 youth reported: 86% increased their consumption of a variety of foods, 91% increased their knowledge of essentials of human nutrition, 84% increased their ability to select low cost, nutritious foods. Volunteers contributed over 23.5 FTEs to the SNAP-Ed program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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704 Nutrition and Hunger in the Population

Outcome #5

1. Outcome Measures

The Expanded Food and Nutrition Education Program (EFNEP) and the Supplemental Nutrition Assistance Education Program (SNAP-Ed) Reduces Health Care Costs in Virginia

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Chronic diseases are the leading cause of morbidity and mortality in the U.S. A sedentary lifestyle and poor diet are linked to being overweight and obese and increases chances of developing chronic diseases. Chronic diseases respond to positive changes in health behaviors. In Virginia, in 2005, 25% deaths were linked to heart disease, and 24% were associated with cancer. In 2005, 1,642 Virginians died from diabetes. Chronic diseases are a financial burden to individuals, to Virginia, and to the nation.

What has been done

EFNEP and SNAP-Ed teaches families, youth, and seniors skills necessary to promote healthy lifestyles, eat more meals at home, prepare healthy and tasty meals for their families, increase fruit and vegetable consumption, control portion sizes, move more every day, move more and watch less television, and replace sugary beverages with healthy options.

Results

Adult participants completing the EFNEP and SNAP-Ed series of six lessons improved nutrition and food behaviors. Post-lesson data reported in EFNEP were: 51% used food labels more often to make food choices, 96.3% improved their diet, 40% increased their fruit consumption, 48% increased consumption of calcium rich foods. In SNAP-Ed post data reported: 49% used food labels more often to make food choices, 81% improved their diets.

4. Associated Knowledge Areas

KA Code	Knowledge Area
704	Nutrition and Hunger in the Population

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy

Brief Explanation

Due to the economic downturn limited income people are living at a higher level of poverty than previously. Food security has become more prevalent due to unemployment and the increased costs of basic food items.

These external factors have made it more difficult to impact the food security problem in Virginia.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

35% of our adult graduates less often run out of food after completing the nutrition education programs.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 12

1. Name of the Planned Program

Global Food Security and Hunger - Local Food Systems

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%	20%	20%	0%
205	Plant Management Systems	20%	20%	20%	0%
206	Basic Plant Biology	20%	20%	20%	0%
704	Nutrition and Hunger in the Population	20%	20%	20%	0%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	20%	20%	20%	0%
	Total	100%	100%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890

Actual Paid Professional	7.2	1.0	7.8	0.0
Actual Volunteer	710.0	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
76499	115685	146429	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
253591	158140	421794	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
641962	0	1699002	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Conduct consumer education workshops and training on food budgeting, the cost effectiveness of local and regional foods, healthy eating and cooking skills, whole farm planning, natural resources management planning
- Conduct educational programs on crop and livestock production, business planning and marketing specific to local marketing channels
- Conduct research on the social, economic and environmental impacts of local or regional food system to communities and the issue of food security
- Conduct research on local or regional food system impact on the dietary and health of consumers
- Encourage collaboration and partnerships to improve food availability, food access, and consumption of fresh, nutritious local foods
- Provide educational programming on whole farm planning, marketing, food safety, and other educational needs to improve supply and availability of local foods.
- Develop and conduct a Virginia food system assessment
 - Continue to implement and education stakeholders about the Virginia Farm-to-Table Plan
 - Organize and conduct, local regional and state conferences

2. Brief description of the target audience

Consumers
 Food system stakeholders
 Producers
 Educators pre-K - 12
 Governmental officials
 Extension educators
 Food-based business owners
 Farm-related business owners
 Environmental professionals
 Health and nutrition professionals
 Retail and institutional food service
 Processors and Distributors
 Community advocates
 Institutions, schools and universities

3. How was eXtension used?

eXtension was used very little in this program. It was used mostly in answering specific questions.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	14167	19008	1390	11

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	1	1	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of programs offered regarding community food systems.

Year	Actual
2011	49

Output #2

Output Measure

- Number of community gardens

Year	Actual
2011	15

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	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	Number of community gardening programs implemented to address food insecurity/hunger issues
3	Encouraging Livestock Exclusion and Community-based Conservation Strategies
4	Development of training modules for new and beginning farmers and ranchers and mentoring networks in Virginia.
5	Participation in community gardens, improvement in diet based on increased consumption of fruits and vegetables, and economic benefits to Henrico County residents.
6	Development of the Virginia Farm to Table Plan, Virginia's first statewide food security strategic plan.
7	Empowering individuals through gardening and addressing hunger in the Chesapeake and Hampton Roads area
8	Strengthening and Expanding Local Food Sales at the Chesapeake Farmers' Market
9	Creating a Culture of Conservation from Farm to Table for Water Quality and Agricultural Community Sustainability in the Shenandoah Valley and Chesapeake Bay Watershed.
10	Direct Market Produce Sales as an Economic Opportunity for Refugee Resettlement and Acculturation
11	Innovative techniques and strategies to increase on farm revenue and improve profitability in heavily urbanized Loudoun County

Outcome #1

1. Outcome Measures

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 Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Food is fundamental to individual health and community vitality. Virginia families and households spend over \$19 billion annually on food purchases (Meter, 2011). These food dollars can be a powerful economic driver for Virginia's farm and food economy. Key focus of Virginia Cooperative Extension's educational programming this year involved educating individuals and communities across the state about the social, environmental and economic importance of a more locally-integrated community based food system. within this context, a goal was to improve the availability, affordability, and accessibility of quality food for all Virginians regardless of socioeconomic levels because without access to quality food it is difficult to live a productive life and for a community to prosper.

What has been done

Virginia Cooperative Extension worked to develop the Virginia Farm to Table Plan. The Plan's objective is to identify issues facing farmers, innovators in the food system, and communities across the state, and to suggest how those issues can be addressed to strengthen Virginia's overall food system. The Virginia Farm to Table Plan Team drew on the expertise and experience of more than 1,920 individuals across the Commonwealth who work in agriculture, aquaculture, fishing, education, finance, philanthropy, nutrition, community planning and economic development, land and natural resources conservation, public policy, local and state government, academics, and youth development. The 38 farm to table recommendations were developed and distilled from research and information gathered from farm-to-table summits, forums, listening

sessions, an online survey, and focus group meetings conducted over a 15-month period by the Virginia Farm to Table Team and the Virginia Food System Council.

Results

Virginia Cooperative Extension has worked closely with the Virginia Food System Council and other food and agriculture organizations to build awareness and begin implementing the 38 recommendations of the Virginia Farm to Table Plan. Most recently, as part of the effort, Virginia established and launched a marketing campaign to challenge Virginia households and businesses to buy \$10 per week of locally-grown

Virginia food and farm products year round. Virginia Cooperative Extension estimates that if each household in Virginia spent \$10 per week of their food budget on locally-grown Virginia food; \$1.65 billion would be generated annually in direct economic impact (Benson and Bendfeldt, 2007). Another recommendation that is being addressed includes working with the Virginia Beginning Farmer and Rancher

Coalition to recruit, train, and establish the next generation of farmers and farm workers to provide quality food through ecologically sound and profitable production systems. Additionally, Virginia is working to expand the following programs statewide to improve food security, prevent land-filling of recoverable food and encourage reuse:

a. Electronic Benefit Transfer (EBT) and Supplemental Nutrition Assistance Programs (SNAP) at farmers markets and Community Supported Agriculture (CSAs) operations, b. community gardening; c. urban agriculture; d. food gleaning network; e. hunters and anglers for hunger; and f. food diversion and composting.

4. Associated Knowledge Areas

KA Code	Knowledge Area
704	Nutrition and Hunger in the Population

Outcome #2

1. Outcome Measures

Number of community gardening programs implemented to address food insecurity/hunger issues

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	16

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Addressing community food security, hunger, justice and public health issues. Food is a basic necessity for life, but also for economic productivity and prosperity. And yet, many Virginians struggle to have access to an adequate supply of healthy food to lead an active productive life. Because of economic constraints, many Virginia households must choose between buying foods or paying for other basic household needs and bills like rent, electricity or medical. Virginia's food insecurity rate at 11.8% is below the national average, but 912,790 individuals are still considered food insecure (Feeding America, 2011).

Additionally, five counties and 5 cities have food insecurity rates of between 19 and 28%, which means 1 in 4 people in those communities does not know where the next meal may come from. For children, food insecurity is even more pronounced across the state with an overall child food insecurity rate of 17.6%. In a few Virginia counties, the childhood food insecurity rate approaches or exceeds 30% (Feeding America, 2011).

What has been done

A key aim of the Virginia Farm to Table Plan developed by Virginia Cooperative Extension and the Virginia Food System Council was to improve food access and health for all Virginians, especially those on low incomes, by expanding community gardens, gleaning networks, electronic benefit transfer (EBT) capabilities at farmers markets and other programs that provide affordable, healthful food to vulnerable and underserved communities.

To achieve this goal, Virginia Cooperative Extension personnel have work with communities and organizations across the Commonwealth to facilitate and strengthen community gardening initiatives. Virginia Cooperative Extension has offered workshops on crop production, soils, integrated pest management, business planning and marketing, facilitation and leadership development to help these initiatives grow and succeed.

Results

Beginning in 2008, Virginia Cooperative Extension worked with United Methodist Urban Ministries of Richmond (UMUMR) and other local partners to create a more equitable food system across Richmond through the development of Shalom Farm. The farm is now operated independently by UMUMR, and serves as a learning lab where people of all ages, education, and income levels come to learn about where food comes from, sustainable agriculture, and food security. Produce on the farm (approximately 30,000lbs in 2011) goes directly to partners in food deserts in Richmond where it is prepared in hot meals, used in cooking classes, and used to supplement food pantries. Moreover, the produce is sold at extremely affordable prices through youth-run farm stands. The Shalom Farms project approaches the challenges facing Virginia's food system from a variety of angles. UMUMR believes healthy urban communities need strong healthy farming communities, and vice-versa. This project works to fill immediate holes in the food system while working on sustainable long term solutions. Under their nonprofit model they are able to donate food, sell at cost or a loss, and invest time and resources into education and relationship building. These are critical components helping to transform communities into places where there will be future economic demand for sustainable and healthy food, as well as citizenry interested in growing and selling produce. To address food access and security in the short- and long-term, similar models and initiatives will need to be developed and

strengthened in communities and regions across the state.

4. Associated Knowledge Areas

KA Code	Knowledge Area
704	Nutrition and Hunger in the Population

Outcome #3

1. Outcome Measures

Encouraging Livestock Exclusion and Community-based Conservation Strategies

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	18

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The subject of riparian area management and livestock exclusion from streams as a way to control non-point source pollution and improve water quality can be contentious and controversial. However, the need to protect water quality and support agriculture is foundational to farming and water stewardship of local waterways in the 21st Century. The focus of this research and extension project was to advance our understanding of the impact of cattle access on stream water quality and habitat, with the goal of identifying and supporting approaches to cattle exclusion that would be more widely and readily implemented by landowners.

What has been done

The water quality benefits of livestock exclusion were evaluated through a number of complementary monitoring studies focused primarily in Muddy Creek, Linville Creek, and Cub Run watersheds in the Shenandoah River basin.

- The primary study used weekly/biweekly grab sampling at more than 30 stream stations in 2010 and 2011, with up to 42 samples at each site. Sampling sites represented a range of streams conditions -- with and without cattle access, and with various types and histories of exclusion -- providing a basis for upstream/downstream, paired-watershed, and multiple site comparisons.

Results

Field studies on several stream segments on four watersheds in Rockingham County, Virginia found benefits to stream water quality and habitat when cattle are excluded by any means. Over 3,000 water samples from more than 30 different stream locations were collected and analyzed. Additional data on stream habitat condition, and benthic macro-invertebrate status were also determined. Storm runoff samples were collected for 8 stream stations.

Results of the field study show that reductions in bacteria and sediment loads are clear benefits of stream exclusion. However, the high groundwater nitrate levels in this region mask any reductions in nutrient loads that could result from cattle exclusion. Fenced reaches downstream of cattle-impacted segments do exhibit improvements with distance downstream, but long reaches with no cattle do not readily counteract even short reaches of heavy impact, thus the need for a watershed approach is evident. On the other hand, there is also evidence that short-term "flash-grazing" and combinations of stream characteristics and cattle density can result in minimal impact on stream water quality. We found significant temporal (diurnal) variation in water quality parameters in cattle-impacted streams, adding complexity to the design of a representative monitoring program.

Working in partnership with the Shenandoah RC&D and the Chesapeake Bay Funders Network livestock exclusion pilot project, 18 farmers have participated to fence more than 73,571 linear feet of stream with setbacks between 3 and 100 feet, to exclude more than 1,023 livestock for a 5-year contract period. Systems included stream fencing, piping, off-stream watering systems (permanent and portable), cattle crossings, and trees for pasture shade. The Shenandoah RC&D and the Chesapeake Bay Funders Network expanded their adaptive fencing pilot project to seven counties, and the NRCS and Virginia Department of Conservation and Recreation implemented an adaptive fencing program based on a 10-foot setback from the stream.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #4

1. Outcome Measures

Development of training modules for new and beginning farmers and ranchers and mentoring networks in Virginia.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Emerging trends in U.S. agriculture suggest that in order to enhance our agricultural resource base we need to establish, sustain, and preserve our farms, farmers, and farmland. Similar to other U.S. regions, Virginia's beginning farmer communities are struggling to obtain long-term viability. Beginning farmers and ranchers face high start-up costs, limited access to farmland, lack knowledge, skills, support structures, and suitable market access (Sheils & Descartes, 2004). Virginia has the potential to strengthen opportunities for beginning farmers and ranchers through enhanced collaboration and program development. A community-based participatory approach to program development would increase the potential for sustainable new farm development.

What has been done

The ?Virginia Beginning Farmer and Rancher Coalition Project? was submitted in 2010 for competitive funding through the USDA, NIFA, BFRDP. The grant was awarded with a project start date of October 2010. The long-term goal: Improve opportunities for beginning farmers and ranchers to establish and sustain viable agricultural operations in Virginia through the development and enhancement of innovative educational programs and networks. Project aims: 1) establish a diverse coalition of organizations and farmers to support the development and growth of education, training, and networking opportunities for Virginia's beginning farmers and ranchers; 2) collaboratively develop and deliver whole farm planning curriculum for beginning farmers and ranchers using experiential learning and classroom delivery methods in focus areas: Introduction, Marketing, Holistic Business Management, Land Acquisition and Tenure, Sustainable Farming Practices, 3) develop and deliver online learning opportunities in whole farm planning; 4) develop and strengthen mentoring networks to facilitate the exchange of knowledge and skills of experienced farmers and ranchers with the beginning farmer and rancher community.

Results

Coalition Project team members formalized a Coalition of stakeholders in 2011. Plans to grow the coalition are ongoing based on Coalition interest and input. A Scholar site and Coalition listserv (n=89 listserv participants) were created for resource and communication sharing. A Beginning Farmer Listserv and Facebook site were created for beginning farmer networking and communication sharing (n=210 listserv participants). A project management team of 6 Virginia Tech faculty and students began meeting bi-monthly to plan for project activity in coordination of a steering committee of 7 farmers/service providers. Major impacts include:

1) Held 4 state-wide Coalition meetings where coalition stakeholders provide input on project direction and network. Coalition Growth: Total 25 Participating Organizations. 2) Collaboratively developed and implemented Statewide Beginning Farmer Survey and two Beginning Farmer focus group sessions. A final survey report was published on website. Survey results illustrated BF preference for online, experiential, and mentoring opportunities (n=200). 3) Collaboratively developed Whole Farm Planning Curriculum comprising 5 Modules. 7 Whole Farm Planning teams will implement programs in 2012 using modules. 4) Piloting mentoring network in

Southwest and Eastern Virginia. Hired two farm mentor coordinators to develop and implement farm mentor networking opportunities. 5) Outreach presentations, workshops, and newsletter publication. E.g., VCE "Getting Started in Ecological Farming Tool Kit", VABBF annual conference and newsletter, Farm Bureau's Young Famers annual conference, VSU Small Family Farm Conference, Spring FFA newsletter, Fall 2011 Virginia YF newsletter. 6) Website creation and social media launch, includes case study profiles of BF and service providers, online resources, and Coalition directory. 7) Planning online learning formats and opportunities for 2012.

4. Associated Knowledge Areas

KA Code	Knowledge Area
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #5

1. Outcome Measures

Participation in community gardens, improvement in diet based on increased consumption of fruits and vegetables, and economic benefits to Henrico County residents.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	12

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nationally almost 40% of children live in low income families according to the National Center for Children in Poverty. Poverty has a significant impact on children. Poor nutrition in infancy can lead to poor brain development and academic difficulties in school. They are more likely to be obese and have a lower life expectancy. It is crucial that children receive proper diet, nutrition and exercise in their developing years. Gardening is a positive experience leading to more exercise and consumption of more fruits and vegetables.

What has been done

In 2008, an interdisciplinary team of Henrico County Extension personnel developed Gardens Growing Families, a community garden program. Henrico County Recreation and Parks offered

land to begin a community garden, and water was provided by Henrico County Public Utilities. Participants applied for the use of garden plots, agreed to participate in educational programs, and maintained their gardens. Garden handbooks were developed and distributed to garden families who attended a garden orientation. Workshops were offered on the importance of fruits and vegetables in one's diet, how to select and grow vegetables, food preparation and preservation, and fall gardening.

Results

Twelve gardening families returned from the 2010 gardening season with 20 gardening families on 26 plots.

82% of 2011 gardeners plan to return to rent a garden plot in 2012.

45% of gardeners gardened with one or more children participating.

91% of gardeners felt that their family's diet improved as a result of fruits and vegetables grown in their garden plots.

As a result of participating in the Gardens Growing Families garden, 72% of gardeners saved up to \$500, with one noting savings of \$750 off of their grocery bill by growing their own fruits and vegetables.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #6

1. Outcome Measures

Development of the Virginia Farm to Table Plan, Virginia's first statewide food security strategic plan.

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
2011	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia's overall food system directly impacts the survival and viability of farms and farmland; the economic development of rural and urban communities; the care, restoration and resilience of ecological resources such as local waterways and the Chesapeake Bay; and critical health issues. Families and households in Virginia spend over \$19 billion annually on food purchases. The purchasing power these food dollars represent can be a powerful economic driver within Virginia's local farm and food economy. Encouraging the continued development of Virginia's food and farm economy can also impact individual and community health outcomes and improve Virginians access to fresh, whole nutritious foods. In the past ten years, the prevalence of obesity in Virginia increased from 19.3 to 25.5% of the population. Even though this obesity rate is lower than many other states, the rapid growth and prevalence of chronic diet-related illnesses is costing us lives, quality of life and economic prosperity. In 2006, the total cost of diabetes for people in Virginia was estimated at \$4.4 billion. Therefore, the promotion of healthy farms and healthy food from farm to consumer table can have a positive impact on the common wealth and common good of Virginia.

What has been done

Virginia Tech's College of Agriculture and Life Sciences, Virginia State University, Virginia Cooperative Extension, The University of Virginia, and the Virginia Food System Council with all its participating organizations initiated the Virginia Farm to Table initiative in September 2010. The goal of the initiative was to strengthen Virginia's food system and economic future through the development of a comprehensive Virginia Farm to Table Plan that informs and integrates assessment, education, development of programs and infrastructure, policy and funding recommendations to address key issues facing farmers, food entrepreneurs, and communities.

Results

Virginia's first food security plan was developed as the Virginia Farm to Table Plan. The Virginia Farm to Table Plan Team drew on the expertise and experience of more than 1,920 individuals across the Commonwealth who work in agriculture, aquaculture, fishing, education, finance, philanthropy, nutrition, community planning and economic development, land and natural resources conservation, public policy, local and state government, academics, and youth development.

The 38 distinct farm to table recommendations were developed and distilled from research and information gathered from farm-to-table summits, forums, listening sessions, an online survey, and focus group meetings conducted over a 15-month period by the Virginia Farm to Table Team and the Virginia Food System Council.

From the list of 38 recommendations for strengthening Virginia's food system and economic future, eight recommendations were identified as key priorities for immediate implementation and action. These eight priority recommendations and the draft Virginia Farm to Table Plan were vetted further at the 2nd Virginia Food Security Summit, where 324 people participated. These results and the Plan will be shared and disseminated to farmers, food system stakeholders, and key decision-makers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
803	Sociological and Technological Change Affecting Individuals, Families, and

Communities

Outcome #7

1. Outcome Measures

Empowering individuals through gardening and addressing hunger in the Chesapeake and Hampton Roads area

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
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginians are increasingly relying on government help to feed themselves during lean economic times. In the month of November 2011, an all time high of 900,000 individuals received assistance to buy groceries in Virginia. The number of Virginia households in the federal Supplemental Nutrition Assistance Program (SNAP) has risen 80 percent since November, 2007.

SNAP disbursed approximately \$1.3 billion to Virginia residents in the 2011 fiscal year. Virginia Department of Social Services Commissioner Martin D. Brown has reported that the number of first-time recipients now eligible for SNAP benefits has risen, because these people have been unemployed for an extended period of time. Temporary Assistance for Needy Families (TANF) benefit recipients are also on the rise.

Recipients of Foodbank services include a large contingency of working individuals and families, many of whom are affected by extreme poverty, malnutrition and related health problems. Overcrowded, substandard housing is the norm for many of these people. Broken families, unemployment and under-employment often paint a bleak, hopeless future. Many children are at-risk from nutrient deficiencies that can lead to serious health problems and poor academic performance.

What has been done

Under the guidance of Agriculture and Natural Resource Horticulture Extension Agents in the Chesapeake, Norfolk, Portsmouth and Virginia Beach units, Extension Master Gardener

volunteers addressed the food shortage through a multi-faceted approach: direct donation of fresh garden produce and canned foods to the Foodbank of Southeastern Virginia, creation of demonstration gardens to teach citizens how to grow their own food, participation in the Plant a Row for the Hungry Program, and healthy food preparation information to area residents. Food donations were collected at Master Gardener events, and garden produce was grown and regularly donated to the Foodbank. Demonstration gardens were cultivated in each city, where volunteers solicited and received donations for seeds and other essential supplies.

Results

In 2011, combined food donations from the Chesapeake, Norfolk, Portsmouth and Virginia Beach units exceeded 13,200 pounds. This contribution to the Foodbank helped provide nutritious canned, boxed, fresh, frozen and prepared food to more than 400,000 individuals (18,000 individuals on the Eastern Shore and 124,000 children).

Benefits realized, but not easily quantified, include increased self-esteem for program participants, increased knowledge of plant science as it relates to gardening, increased physical activity, diminished personal food costs, and an appreciation for the dignity of labor.

4. Associated Knowledge Areas

KA Code	Knowledge Area
206	Basic Plant Biology

Outcome #8

1. Outcome Measures

Strengthening and Expanding Local Food Sales at the Chesapeake Farmers' Market

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
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Virginia there is increased interest in purchasing and eating locally grown fruit and vegetables. This heightened demand for locally grown food has spurred many people to pursue the business of growing produce to sell at their own farm stands or local farmers markets. Virginia Cooperative Extension stands prepared to assist people with all levels of experience to engage in growing their own food or establish markets for persons to purchase fresh locally grown fruits and vegetables.

What has been done

In 2011, Chesapeake VCE organized and managed a Chesapeake Farmer's Market which has been operated continuously for the past eleven years. Chesapeake VCE has established rules which require vendors to be producers of what they offer to sell. Extension works cooperatively with the Virginia Department of Agriculture to promote Chesapeake Farmers' Market to the public. The Chesapeake Master Gardeners and Family Consumer Science Agent occasionally set up a table at the market to answer patron's questions about growing or preparing vegetables for consumption. Chesapeake VCE responded to dozens of requests for consultation on issues such as soil testing, variety selection, disease and pest identification, and marketing ideas. Chesapeake VCE annually conducts a Fruit & Vegetable Workshop to educate farmers and help them become better producers.

Results

The patronage of Chesapeake Farmers Market has increased each year and brought more farmers to the market. A survey conducted by Chesapeake VCE revealed 78% of people surveyed at the market made frequent visits to the market. 48% patronized the market at least once a week spending at least \$20 per visit. Supportive comments such as "fantastic, convenient, great selection, fresh" continue to grow this market each year. As a result, the City of Chesapeake has developed plans to build a Farmer's Market structure in 2012. Chesapeake VCE intends to utilize this facility to offer programs on vegetable/fruit/plant production and nutrition/food safety. This structure will bring a permanent presence and aid in strengthening the connection between local agricultural growers with local customers or food-related businesses.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #9

1. Outcome Measures

Creating a Culture of Conservation from Farm to Table for Water Quality and Agricultural Community Sustainability in the Shenandoah Valley and Chesapeake Bay Watershed.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Shenandoah Valley region is Virginia's breadbasket: four of Virginia's top five agricultural producing counties are based here. The region is also a top agricultural and urban contributor and hotspot for nutrient and sediment inputs into the Chesapeake Bay. High energy consumption, large-scale use of synthetic fertilizers for agricultural production, a high degree of international trade (especially throughout the poultry industry), a low recycling rate of some animal manures and economic limits to efficient long-distance transportation of bulky materials can contribute to excessive nitrogen and phosphorus levels and loads in our local waterways and the Chesapeake Bay.

What has been done

Through funding from the National Fish and Wildlife Foundation, Virginia Cooperative Extension and project partners are working to make the Shenandoah Valley food system inherently more sustainable by better capturing and reusing nutrients, reducing high energy costs, and supporting sustainable, environmentally sound production practices, including more pasture and grass-based systems. This goal will be accomplished through the development and implementation of Continuous Improvement Plans (CIPs) that farmers agree to implement over a two-year period, expanding Buy Fresh Buy Local efforts, encouraging the region's universities, schools, hospitals and larger institutions to procure more of their food locally, and engaging more homeowners in nutrient reduction efforts.. The practices that are implemented as part of the CIP will verified for nutrient load reductions of nitrogen and phosphorus on a per pound and whole-farm basis. Additionally, the project expands outreach to farmers, homeowners, consumers, and institutions through Buy Fresh Buy Local promotional materials and development of FreshFork Market Shenandoah Valley as a software platform for facilitating ordering and procurement of locally-grown Virginia farm products.

Results

Through this innovative farm-to-table project, current conservation performance has been assessed for current nutrient loads and Continuous Improvement Plans (CIPs) have been developed for 32 farms, including conventional dairy, beef and poultry operations transitioning to some local food production and direct marketing, as well as CSAs, farmers markets, and orchards. In 2011, 48,000 copies of a 12-page SV Buy Fresh Buy Local food directory was published and distributed throughout 11 counties in the Shenandoah Valley region. The guide helped to promote and educate consumers about the availability of fresh produce from the following food enterprises: 26 farmers markets, 13 farmstands & orchards, 10 CSAs, 1 produce auction, 54 produce businesses, 26 restaurants and caterers, 17 grocers, retailers, & food co-operatives, 46 sources of meat/poultry/dairy, 9 vineyards, 39 specialty product producers, and 24 educational institutions. According to a recent University of Northern Iowa study where the Buy Fresh Buy Local program was implemented,

every \$1 invested in the program returned a \$6.50 economic impact to the community. Copies of the directory were directly mailed to 6,000 Clarke County residents, and about 2300 households in Massanutten and Belmont neighborhoods of Rockingham County. Additional outreach and extension programming is on-going as we encourage everyone to be involved in conservation and to be part of the solution. The FreshFork Market Shenandoah Valley software platform is being beta tested and several institutions have expressed keen interest in the concept for expanding procurement of local products.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #10

1. Outcome Measures

Direct Market Produce Sales as an Economic Opportunity for Refugee Resettlement and Acculturation

2. Associated Institution Types

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

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The number of refugees coming to Virginia has steadily increased from 1108 in 2006 to 1836 in 2009. A 2011 report found that the majority of the refugees entering the state settled in Northern Virginia (30%), Hampton roads (18%), metropolitan Richmond (14%), and Roanoke (13%). Many refugees enter the United States with limited English proficiency and opportunities for employment, but they bring with them decades of farming experience from their homelands. Refugees entering the state come from three main world regions, Asia, the Middle East, and Africa. The Refugee and Immigration Service office in Roanoke resettles more than 200 immigrants per year in the area. Over 11,000 immigrants currently live in Roanoke, many of whom were farmers in their homeland, including 125 Somali Bantu.

What has been done

VCE partnered with VT EarthWorks, an incubation program for agriculture businesses, and VT Coalition for Refugee Resettlement to include the Bantu in the 2011 Growers Academy, an 8-week learning series that offers workshops on crop production, soils, integrated pest management, business planning and marketing. Five Bantu farmers completed the academy and started Juba Farms on an acre plot leased at the Catawba Sustainability Center, a 377-acre VT farm property in Roanoke county. VCE coached the Bantu Farmers weekly through the growing season to plant, cultivate, tend, harvest, and sell crops following sustainable vegetable production methods, while VT EarthWorks facilitated market opportunities.

Results

Juba Farms successfully established itself as an agricultural business with more than \$1728 in receipts. The Bantu farmers successfully completed the 8-week Growers' Academy, planted crops, and sold product at market. Additionally, they developed marketing materials to promote Juba Farms, including business cards, a brochure, and a farm logo. The farmers were able to sell produce at the Catawba Farmers' Market; through a virtual farm market, runner-bean.com; and to Local Roots, a restaurant in Roanoke's Grandin community. At a breakfast meeting at the end of the growing season, the farmers were able to voice observations about selling product in the market places and decisions made for the next production cycle based on 2011 experiences. The Bantu had not seen a soil test before, and were not familiar with irrigation methods, such as drip tape, subsurface irrigation, and overhead sprinklers. They learned "how to organize the farm, to put everything in rows." In addition to gaining business and production experiences, the Juba Farm project strengthened the farmers' English-speaking skills and comfort with community interactions. The Juba farmers repeatedly expressed appreciation to VT and VCE for the opportunity to farm, to be trusted, to do "what they wanted to do (farm)".

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #11

1. Outcome Measures

Innovative techniques and strategies to increase on farm revenue and improve profitability in heavily urbanized Loudoun County

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
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The number of farms in Loudoun county has grown by 61% since 1997 while the number of acres devoted to agricultural production has dropped by 34% since 2002. A majority of farms can not rely on the traditional "economy of scale" type production to remain sustainable and many local farmers are looking to innovative new techniques to increase on farm revenue and improve profitability.

What has been done

This situation of declining farm numbers and increased urbanization is a scenario that is repeated in many of the counties that surround the Washington Metropolitan area. This addresses Virginia Tech's College of Agriculture and Life Sciences key initiative in agriculture and environmental sustainability, and Cooperative Extension's planned program in economics and commerce. The Loudoun County Extension unit teamed with the members of the Blue Ridge Rural Working group to offer a 6-hour educational forum for farmers and landowners. More than 235 producers representing Virginia, Maryland, West Virginia, and Pennsylvania attended the forum. This program showcased new research, replicable, innovative ideas that can enhance farm or rural business profitability, conserve farm land or natural resources and develop new production approaches that are viable in an expensive farm land upscale consumer market.

Results

Presentations and testimonials were provided that emphasized farming for high profitability by using innovative and sound business approaches that are suited to the Mid Atlantic Region. A post-forum survey indicated 72% of the 253 producers (+9% over 10) participants stated that they are considering implementing one or more of the strategies into their current operations in the next year. 93% of respondents desired additional training or information on one or more of the topics presented.

Collaborators: The Blue Ridge Rural Working Group consisting of VCE and WVU Agricultural and Natural Resource agents, Extension Specialist from Virginia and USDA Beltsville Researchers along local agricultural producers and Agricultural Development officers from multiple counties.

4. Associated Knowledge Areas

KA Code	Knowledge Area
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

The economic situation and climate has been the major factor affecting educational programming and implementation. It has been positive in that people are more aware of the economic impact of the local food system, but incidences of food insecurity have increased in the state because of employment and income challenges. In some instances, funding and priorities with partner agencies (Natural Resources Conservation Services (NRCS), Resource Conservation and Development Councils (RC&D), and Soil and Water Conservation Districts (SWCD) changed during the past year and a half, which impacted the implementation of practices and some programs because of the loss of technical support for design and specification of practices.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

In surveying people for development of the Virginia Farm to Table Plan, the top five topics identified as key issues by participants included: 1) understanding by government officials, of the economic, environmental issues surrounding the local food system; 2) Development of food outlets with local and regional foods; 3) economic impact of local and regional food systems on localities; 4) training, knowledge, and support to market development for local and regional products; and 5) land use planning and zoning considerations for food system needs.

Additionally, consumer focused educational programs on healthy eating and cooking with local and regional foods was another to need. Participants also emphasized that the following programs should be expanded and strengthened statewide to improve food security:

- a. Electronic Benefit Transfer (EBT) and Supplemental Nutrition Assistance Programs (SNAP) at farmers markets and Community Supported Agriculture (CSAs) operations,
- b. home and community gardening,
- c. urban agriculture,
- d. food gleaning network,
- e. hunters and anglers for hunger, and
- f. food diversion and composting.

Key Items of Evaluation

Additionally, consumer focused educational programs on healthy eating and cooking with local and regional foods was another to need. Participants also emphasized that the following programs should be expanded and strengthened statewide to improve food security:

- a. Electronic Benefit Transfer (EBT) and Supplemental Nutrition Assistance Programs

(SNAP) at farmers markets and Community Supported Agriculture (CSAs) operations,

- b. home and community gardening,
- c. urban agriculture,
- d. food gleaning network,
- e. hunters and anglers for hunger, and
- f. food diversion and composting.

Conduct ongoing assessments of diet and health, food deserts, access and availability (i.e., proximity, transportation, financial/economic, other) to local, regional food systems.

More items for evaluation can be found in the Virginia Farm to Table Plan available at www.virginiafarmtotable.org.

V(A). Planned Program (Summary)

Program # 13

1. Name of the Planned Program

Global Food Security and Hunger - Pest Management

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	10%	0%	10%	10%
211	Insects, Mites, and Other Arthropods Affecting Plants	10%	0%	10%	10%
212	Pathogens and Nematodes Affecting Plants	10%	0%	10%	10%
213	Weeds Affecting Plants	10%	0%	10%	10%
216	Integrated Pest Management Systems	20%	100%	20%	20%
403	Waste Disposal, Recycling, and Reuse	10%	0%	10%	10%
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	10%	0%	10%	10%
723	Hazards to Human Health and Safety	10%	0%	10%	10%
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	10%	0%	10%	10%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Actual Paid Professional	31.0	0.5	33.4	1.5
Actual Volunteer	534.0	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
327326	108521	626543	228953
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1085073	85030	1804783	251448
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2746846	0	7269738	46777

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct workshops, meetings, field tours, demonstrations, develop training media, training manuals, curriculum, resources, provide training, provide counseling, conduct assessments, facilitate meetings, and document stakeholder input, partner with other state and federal agencies including VDACS, USDA, EPA, NRCS, conduct pesticide disposal events and related activities, conduct on-line courses and hands-on activities, conduct research experiments and surveys, maintain websites, the VA Ag Pest Advisory, and phone assisted hotlines.

2. Brief description of the target audience

Consumers, landowners, homeowners, producers, producer groups, pesticide applicators seeking certification under federal and state laws, pesticide regulators, boards, commissions, and enforcement officials, local government, councils, and community groups, universities, colleges, K-12, youth aged 13-18, schools, advocacy and consumer protection groups and associations, pesticide safety educators, pest management specialists, and related experts, authors, journalists, other media specialists, institutional, industrial, and vector control groups and individuals, health/medical, environmental, and emergency response personnel and organizations, farm workers, migrants, and day-laborer groups and individuals, and researchers, scientists, pesticide toxicologists, extension educators and related experts.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	57100	53230	5068	80

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

Patent Applications Submitted

Year: 2011

Actual: 1

Patents listed

Dogwood borer sex pheromone was identified and patented jointly by the USDA ARS and Virginia Tech for use as a mating disruptant for managing dogwood borer in apple orchards.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	21	82	103

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of non-peer reviewed outreach citations incorporating information on the most effective IPM strategies and systems for use on selected commodities and/or at selected sites

Year	Actual
2011	180

Output #2

Output Measure

- Number of private applicators trained for certification

Year	Actual
2011	1000

Output #3

Output Measure

- Number of commercial applicators trained for certification

Year	Actual
2011	2000

Output #4

Output Measure

- Number of private applicators trained for recertification

Year	Actual
2011	2500

Output #5

Output Measure

- Number of commercial applicators trained for recertification

Year	Actual
2011	2500

Output #6

Output Measure

- Number of non-certified applicators trained

Year	Actual
2011	5000

Output #7

Output Measure

- Number of stakeholders enrolled in the IPM Stakeholder Network

Year	Actual
2011	200

Output #8

Output Measure

- Number of trainers and regulatory officials trained

Year	Actual
2011	494

Output #9

Output Measure

- Educational media website visits communicated through the Pesticide Safety Education website

Year	Actual
2011	30085

Output #10

Output Measure

- Number of non-peer reviewed research citations incorporating information on the most effective IPM strategies and systems for use on selected commodities and/or at selected sites.

Year	Actual
2011	98

Output #11

Output Measure

- Number of presentations on IPM related topics.

Year	Actual
2011	574

Output #12

Output Measure

- Number of volunteer hours dedicated to pest management programming

Year	Actual
2011	11762

Output #13

Output Measure

- Number of extended learners with four or more hours of contact related to pest management

Year	Actual
2011	22848

Output #14

Output Measure

- Amount of revenue generated in dollars for pest management Extension and research programming

Year	Actual
2011	5426369

Output #15

Output Measure

- IPM publications for clientele including extension publications, manuals and guides, multi-media pieces, websites, newspaper and trade journal articles, and papers provided at production meetings and field days.

Year	Actual
2011	201

Output #16

Output Measure

- Number of samples evaluated by current and improved plant diagnostic methods

Year	Actual
2011	2450

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of individuals gaining knowledge of IPM through training course completion and/or examination
2	Number of applicators who gain knowledge in pesticide safety through certification training and pass the state certification exam(s)
3	Number of applicators who gain additional knowledge in pesticide safety through re-certification training and sufficient credit to maintain their certification
4	Number of applicators, farm workers, and the general public who gain knowledge in general pesticide safety who are not seeking certification as pesticide applicators.
5	Number of trainers who gain knowledge in pesticide safety and pesticide curriculum and program training in established train-the-trainer workshops
6	Number of pesticide drift violations prosecuted by VDACS remains at 10 or below.
7	Threshold number of personal protective equipment violations prosecuted by VDACS
8	Through educational programming and collaborative efforts, support the collection and proper disposal of unwanted pesticides in Virginia localities.
9	Number of localities participating in a pesticide container recycling program.
10	Number of participants gaining knowledge about invasive NIS
11	Increase the number of stakeholders collaborating with pest management strategic planning activities -- which support the communication of the pest management needs of Virginia and regional agricultural interests to pesticide regulatory policymakers.
12	Increase in the number of facilities that are impacted in a positive way by IPM program activities.
13	Number of Virginia soybean growers aware of Asian soybean rust risk to their crop.
14	Number of Virginia soybean growers who apply fungicide based on Asian soybean rust detection activities
15	Using advisories, pest monitoring, and economic thresholds for managing corn earworm in soybean
16	Minimizing tree losses in the Urban landscape from ambrosia beetle attack.
17	Improving management of Colorado potato beetle on Virginia potatoes

18	Cucurbit downy mildew monitoring to improve management in cucurbit crops in Virginia
19	Using Virginia's Potato Disease Advisory to reduce pesticide applications and increase profitability for potato producers.
20	Using integrated pest management techniques to reduce the spread of invasive weed species in the nursery industry
21	Using surveys, field trials and direct communications with growers and crop advisors to improve management of brown marmorated stink bug in Virginia soybean fields
22	Implementing new practices for protecting the ornamental horticulture industry from box blight disease
23	Providing pest identification and IPM materials via the Virginia Tech Plant Disease Clinic to increase adoption of IPM practices by homeowners and producers across Virginia

Outcome #1

1. Outcome Measures

Number of individuals gaining knowledge of IPM through training course completion and/or examination

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	6028

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Pesticide applicators use pesticides as only one method for pest management. Integrated pest management (IPM) includes many methods that can be used to reduce pesticide use, reduce costs, and improve efficacy.

What has been done

IPM curricula continues to be an important component of all pesticide applicator education programs. IPM was required to be included in workshops throughout Virginia for private applicator training. It was also incorporated in most commercial applicator training workshops and all training media for all applicators.

Results

In 2011, 115 recertification courses were delivered as 182 private applicator training sessions were approved. Over 2,500 applicators/farmers participated in these workshops. IPM content was included to give individuals potential knowledge of IPM by course completion. Certification courses and training manuals were provided with another 2,500 individuals. Over 544 others participated in three online courses for core training (including IPM content) for all applicators. There were 210 employers who sent employees through the online courses in 2011. Two other workshops were held for 109 trainers/teachers and an online course for 375 pesticide investigators was offered in 2011.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
723	Hazards to Human Health and Safety

Outcome #2

1. Outcome Measures

Number of applicators who gain knowledge in pesticide safety through certification training and pass the state certification exam(s)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	2500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

State and federal pesticide laws and regulations require that all pesticide applicators comprehend and follow pesticide labels to safely apply pesticides in Virginia. The impact of pesticide misuse has the potential to harm human health and environment.

What has been done

Any farmer (private applicator) using restricted use pesticides and all commercial applicators must be certified to apply pesticides in Virginia. Pesticide safety education provides applicators an opportunity to gain knowledge in order to successfully pass state certification examinations and qualify for licensure.

Results

Over 3,600 training manuals, 574 presentations, 80 workshops, and 544 training online training enrollments (20 hours each) were offered to applicators in 2011. Success in passing the state certification examinations was a measure of impact. Exam failure rates varied and averaged around 18% for all categories. An estimated 2,500 gained sufficient knowledge to pass exams in 2011.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
403	Waste Disposal, Recycling, and Reuse
723	Hazards to Human Health and Safety
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #3

1. Outcome Measures

Number of applicators who gain additional knowledge in pesticide safety through re-certification training and sufficient credit to maintain their certification

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	5000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

State and federal pesticide laws and regulations require that all pesticide applicators comprehend and follow pesticide labels to safely apply pesticides in Virginia. The impact of pesticide misuse has the potential to harm human health and environment.

What has been done

Recertification courses were offered to private and commercial pesticide applicators statewide. These courses were in the form of workshops and hands-on demonstrations.

Results

There were 182 recertification courses offered for private applicators in 2011. Extension also either hosted or supported over 80 commercial applicator training courses.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
403	Waste Disposal, Recycling, and Reuse
723	Hazards to Human Health and Safety
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #4

1. Outcome Measures

Number of applicators, farm workers, and the general public who gain knowledge in general pesticide safety who are not seeking certification as pesticide applicators.

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
2011	5624

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

State and federal pesticide laws and regulations require that all pesticide applicators comprehend and follow pesticide labels to safely apply pesticides in Virginia. The impact of pesticide misuse has the potential to harm human health and environment.

What has been done

The VTPP.ORG website was used to convey information to the general public. The statistics from areas for the general public and applicator use of the site are tracked using Google Analytics. The data are specific to country, state, and locality. For Virginia, we measured users statewide. In addition, all applicator training programs were open to the public. As a result, non-certified applicators attend these programs. In addition, information and programs involving pesticide safety are conveyed through localities by master gardener program leaders, Extension agents, and specialists. We also offer online training in pesticide safety for non-certified applicators - some not seeking certification. Extension agents worked with Telamon Corporation to offer training to non-English speaking farm workers and handlers.

Results

Non-certified applicators attended over 200 meetings for pesticide applicators seeking certification. These non-certified applicators attended as non-certified trainees, farmworkers, and handlers. An estimated 2,000 non-certified applicators attended these meetings. In addition, over 2,500 home gardeners and applicators attended master gardener training involving pesticide safety in 2011-12. Over 1,000 farmworkers and handlers attended worker protection training hosted by VCE and Telamon last year. There were 124 non-certified applicators who registered and took an online course in pesticide safety in 2011-12. Many of these were students in vocational agriculture at high schools, and others were college students taking horticulture and agriculture classes in colleges and universities across Virginia.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
403	Waste Disposal, Recycling, and Reuse
723	Hazards to Human Health and Safety
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #5

1. Outcome Measures

Number of trainers who gain knowledge in pesticide safety and pesticide curriculum and program training in established train-the-trainer workshops

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	494

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

State and federal pesticide laws and regulations require that all pesticide applicators comprehend and follow pesticide labels to safely apply pesticides in Virginia. The impact of pesticide misuse has the potential to harm human health and environment.

What has been done

Ongoing training and annual workshops was provided to Extension agents and specialists who conduct pesticide safety education in Virginia. An annual Vo-AG Teacher Pesticide Safety Education Institute was offered again in 2011. Online training was offered for pesticide investigators who hold applicators under compliance for pesticide recordkeeping in 2011.

Results

In 2011, 85 Extension agents and specialists participated in the 2011 Virginia Pesticide Safety Educators (train-the-trainer) Workshop. This was the 19th annual workshop offered to Extension faculty. This year 10 state pesticide investigators also participated. Twenty-four Vo-Ag teachers participated in an annual workshop targeting these trainers in July 2011. USDA pesticide investigators (375) from across the nation participated again this year in our online training for that group.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants

216	Integrated Pest Management Systems
403	Waste Disposal, Recycling, and Reuse
723	Hazards to Human Health and Safety
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #6

1. Outcome Measures

Number of pesticide drift violations prosecuted by VDACS remains at 10 or below.

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Threshold number of personal protective equipment violations prosecuted by VDACS

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

Through educational programming and collaborative efforts, support the collection and proper disposal of unwanted pesticides in Virginia localities.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	27

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The disposal of canceled, banned or unwanted agricultural and commercial pesticides poses a significant challenge to agricultural producers and other pesticide users due to its high cost. The proper disposal of waste pesticides eliminates a potential threat to health and the environment.

What has been done

Virginia's Pesticide Disposal Program is a cooperative effort between the Virginia Department of Agriculture and Consumer Services (VDACS) and the Virginia Pesticide Control Board, with participation from Virginia Cooperative Extension and the Division of Consolidated Laboratory Services. The program assists agricultural producers, licensed pesticide dealers and pest control firms, golf courses and homeowners with the proper disposal of unwanted pesticides. The program is available at no cost to eligible participants.

No general fund tax dollars are used to implement the program. The program is supported by pesticide fees collected by VDACS.

Results

In 2011, 58,364 pounds of canceled, banned or unwanted agricultural and commercial pesticides were collected and subsequently destroyed from 27 localities in northern and north-central Virginia. Since its inception, the Virginia Pesticide Disposal Program has collected and destroyed a total of 1,146,495 pounds of pesticides.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
403	Waste Disposal, Recycling, and Reuse
723	Hazards to Human Health and Safety
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #9

1. Outcome Measures

Number of localities participating in a pesticide container recycling program.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	18

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Disposing of used plastic pesticide containers, in a manner that does not threaten the environment, poses a challenge for agricultural producers and custom applicators. Typically, pesticide applicators dispose of their empty, clean plastic pesticide containers by hauling them to the local sanitary landfill.

What has been done

The Virginia Plastic Pesticide Container Recycling Program is a cooperative effort among Virginia Department of Agriculture and Consumer Services (VDACS), Pesticide Control Board, Virginia Cooperative Extension, and local governments. The program is administered by local governments under national guidelines developed by the Ag Container Recycling Council. Grant monies are provided to participating local government to defray the costs. Recycling sites are established in participating localities to accept properly rinsed plastic pesticide containers. Other sites will be established as the program expands. All pesticide containers are inspected by trained local personnel. Containers are granulated by a contractor with assistance from VDACS and local personnel. Granulated chips are transported to recycling facilities and fabricated into items such as pallets, fence posts, field drain tiles and parking stops.

Results

Virginia's container recycling program began in 1993 in six localities with more than 35,000 containers recycled. The number of participating localities has steadily increased from 6 in 1993 to 18 in 2011. In addition, individual pesticide dealers also participated in the program. In 2011, 14 pesticide dealers either hosted a recycling site for the locality or collected their own containers for granulation. A total of 70,538 plastic pesticide containers were recycled in 2011, for a total of 1,185,461 recycled since 1993. This equates to over one million pounds of plastic collected for refabrication.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
403	Waste Disposal, Recycling, and Reuse
723	Hazards to Human Health and Safety
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #10

1. Outcome Measures

Number of participants gaining knowledge about invasive NIS

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	3800

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Brown marmorated stink bug (BMSB) is now an established pest of many fruit crops, many vegetable crops, sweet corn, field corn and soybean throughout Virginia. Crop damage can be excessive and multiple insecticide applications can be required to provide protection. Basic biology studies and pest management practices are under development.

What has been done

Many separate research efforts are underway to develop information on the life history, number of generations, alternate host plants, movement across the weed/tree/crop landscape, monitoring methods, economic thresholds, sampling procedures and insecticide efficacy. Projects are focusing on tree fruit, vineyards, vegetables and soybean, are located in the different regions of the state where these crops are prevalent, and involve many faculty as well as collaboration with other states in the mid-Atlantic region. Results of 2011 efforts have been presented to hundreds of clientele at field days and winter meetings across the state.

Results

Growers are beginning to incorporate new information into their pest management plans and activities. For example, results of extensive field surveys and on-farm field trials showed that BMSB infestations in soybean were almost exclusively confined to field edges. Growers were alerted to this via contacts with IPM field scouts, their local ANR agents, and the VA Ag Pest Advisory. With this information, most chose to treat only field edges with insecticides. Post treatment visits to 12 commercial fields in 5 of the Counties most impacted by BMSB showed that these edge treatments were effective, providing season-long control. In general, depending on field size, treating field edges, only, resulted in 30 to 80 percent fewer acres being treated than had entire fields been treated.

4. Associated Knowledge Areas

KA Code	Knowledge Area
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #11

1. Outcome Measures

Increase the number of stakeholders collaborating with pest management strategic planning activities -- which support the communication of the pest management needs of Virginia and regional agricultural interests to pesticide regulatory policymakers.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	150

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The 1996 Food Quality Protection Act created a major transition period and hardship for traditional agriculture and specialty crop growers. IPM strategies were actually put in jeopardy by this transition process and the impact has been a threat to the ability of producers to grow healthy crops and control pests and diseases on those crops.

What has been done

The Southern IPM Center and Virginia Tech worked together to implement the Southern Region Regulatory Information Network to assess needs and convey those needs to USDA and EPA from stakeholders in the field. This effort supports the development of IPM documents including pest management strategic plans, crop profiles, and IPM Elements.

Results

The Southern Region Regulatory Information Network was organized into a series of sub-regions to communicate with stakeholders in four groups and report back to the working group monthly by conference call. Communication through the network supported stakeholders in turfgrass, wine grapes, and locally grown crops. The network involved over 150 stakeholders in 2011.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
723	Hazards to Human Health and Safety

Outcome #12

1. Outcome Measures

Increase in the number of facilities that are impacted in a positive way by IPM program activities.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Adoption of IPM practices can have a positive impact on schools, public housing, commercial buildings, farms, orchards and landscapes. A growing number of clientele across the state are aware of the advantages of minimizing the use of pesticides and support adoption of IPM alternatives if they are proven to be both practical and economically feasible.

What has been done

Many faculty and staff in different academic departments and extension agents across the state and are invested in the development and promotion of IPM practices. Programs address current and invasive pest species of homes, buildings, and crop lands. Each year hundreds of hours are dedicated to researching new pest management methods and delivery of information to clientele via meetings and printed and electronic media.

Results

Impacts are difficult to measure directly but must be estimated in terms of improvements in economic well being and environmental quality. Thousands of clientele are exposed each year to new and continuing IPM programs and in almost all respects, whether in public schools, fruit orchards or commercial row crop farms, clientele are using pesticides more efficiently and less often, while maintaining pest-free structures and high quality, high yielding crop commodities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants

216	Integrated Pest Management Systems
723	Hazards to Human Health and Safety
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #13

1. Outcome Measures

Number of Virginia soybean growers aware of Asian soybean rust risk to their crop.

Not Reporting on this Outcome Measure

Outcome #14

1. Outcome Measures

Number of Virginia soybean growers who apply fungicide based on Asian soybean rust detection activities

Not Reporting on this Outcome Measure

Outcome #15

1. Outcome Measures

Using advisories, pest monitoring, and economic thresholds for managing corn earworm in soybean

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Soybean production is the largest proportion of Prince George County's row crops at 11,000 acres and valued at over \$4.8 million. Corn earworm is the major insect pest of soybeans. Corn earworm can cause major economic damage with yield losses of 10-25% (\$30-\$75 per acre)

during heavy infestations. Corn earworm control can be accomplished with current IPM strategies very successfully however field scouting can be a time consuming process for large acreages. Scouting is critical to determining the proper timing for insecticide applications.

What has been done

Two blacklight moth monitoring traps are maintained in Prince George County. The traps are checked two times each week from July- September. Corn earworm moth counts are submitted to the Virginia Corn Earworm Advisory as well as conveyed to growers and agriculture dealers locally through one-on-one contact and newsletters. A spike in moth counts indicates that corn earworm moths are laying eggs in producer fields and scouting should begin within one week. In addition to the blacklight traps, I survey corn fields in the county to assess corn earworm infestation of corn ears. Dr. Ames Herbert uses this data to create an area wide forecast of potential corn earworm infestation in soybeans. The 30+ year regression trend shows that % corn infestation from the survey correlates very well to % soybean acres treated for corn earworm. I also randomly sample soybean fields throughout the county as well as respond to individual grower questions.

Results

In 2011, the corn earworm survey indicated a moderate potential for corn earworm problems in soybean with a 49% infestation level. The weekly blacklight trap counts indicated a large presence of moths in early August and a smaller flush around Labor Day. Scouting the next week revealed that corn earworms were present and about 10 days after the moth peak worm numbers were at threshold levels. This local monitoring system alerted growers to the corn earworm problem in advance and continued their focus after the disruption of Hurricane Irene. I estimate that 2,500 acres of soybeans were treated for corn earworm. With an average treatment cost of \$12 per acre the monitoring program saved producers over \$78,000 in treatment costs over 2010.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #16

1. Outcome Measures

Minimizing tree losses in the Urban landscape from ambrosia beetle attack.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Ambrosia beetles are pests of ornamental, fruit, and nut trees throughout the central and eastern US, and can cause significant damage particularly in nurseries. Infested trees often die from early spring attacks.

What has been done

Nursery operations in Goochland, Accomac, Northampton, Isle of Wight, Lancaster, and Northumberland counties and cities of Virginia Beach, Chesapeake and Suffolk that had experienced losses in past years participated in a pest monitoring and trapping evaluation program.

Results

None of the ten nurseries that used the monitoring results to properly time insecticide applications or the trap tree deployment strategy sustained any losses from ambrosia beetles.

4. Associated Knowledge Areas

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

Outcome #17

1. Outcome Measures

Improving management of Colorado potato beetle on Virginia potatoes

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia remains a major producer of summer potatoes in the U.S., and pest management is critical to successful crop production. Without effective control of Colorado potato beetle and other insect pests, crop yield losses would exceed 50% annually in most Virginia potato fields. Further, Colorado potato beetle has developed resistance to many of the insecticides used to control it in some parts of the U.S. The primary goal of this research was to evaluate the efficacy of management strategies that are safer for the user and the environment.

What has been done

With researchers from Michigan State, Wisconsin, and the USDA, I collaborated on a competitive grant that was submitted to the USDA-ARS Special Potato Grants Program entitled "Managing insecticide resistance in the Colorado potato beetle and developing management options for resistant beetles". The grant was funded in 2011 with \$10,000 budgeted to my program at Virginia Tech. I also obtained additional funds from several agrichemical industry grants totalling around \$50,000 to conduct research on Colorado potato beetle and other potato pests. Much of this funding is supporting a Ph.D. student, Adam Wimer, who has completed a number of field research studies on Colorado potato beetle at the Virginia Tech Eastern Shore AREC. Novel pesticides, including many biological biorational chemistries were evaluated for control of the major arthropod pests of potato.

Results

Research demonstrated the toxicity and field efficacy of a novel insecticide tolfenpyrad, which has a unique mode of action targeting the mitochondrial electron transport chain. In addition, several other biorational insecticides including the anthranilic diamides chlorantraniliprole and cyantraniliprole, as well spinetoram, novaluron, and clothianidin were demonstrated to be as efficacious as standard neonicotinoids imidacloprid and thiamethoxam at controlling Colorado potato beetle. All of these compounds are considered reduced risk products with low use rates, which can help reduce health risks to consumers, applicators, and the environment. Moreover, the novel mode of actions of these newer chemicals can aid in insecticide resistance management. These efficacy data from Virginia aided in getting many of these novel insecticides registered as products for use on potatoes in the U.S., including Coragen and Voliam (chlorantraniliprole), Radiant (spinetoram), Rimon (novaluron), and Belay (clothianidin). Results from these research trials were presented locally, in-state, and nationally at a number of extension venues, scientific meetings, and field days.

4. Associated Knowledge Areas

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

Outcome #18

1. Outcome Measures

Cucurbit downy mildew monitoring to improve management in cucurbit crops in Virginia

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia produces approximately 6,000 acres of cucurbits annually. Of the cucurbits crops, pumpkins have become the Commonwealth's most popular accounting for at least 3,000 acres. Cucurbit downy mildew, caused by the airborne fungus *Pseudoperonospora cubensis*, is the most devastating disease of cucurbits in Virginia. Under favorable environmental conditions cucurbit downy mildew can cause complete crop and severe monetary losses. Pumpkins and cucumbers are especially susceptible to this disease.

What has been done

Cucurbit downy mildew research is annually conducted at Virginia Tech's Eastern Shore AREC in Painter, VA. Research focuses on resistant cultivars, planting dates, and fungicides that may be appropriate management tactics for Virginia cucurbit growers. In addition, Virginia is part of the IPM-PIPE program that monitors the movement of cucurbit downy mildew throughout the United States. Sentinel plots are utilized to serve as early detection sources for cucurbit growers across the state.

Results

Our research efforts have identified that host resistance can reduce downy mildew levels and when complimented with proper fungicides, profitable crops can be produced. The use of sentinel plots and early detection systems in Virginia has saved growers fungicide applications when the threat of disease does not exist. If the sentinel plots can save growers one fungicide application on average, Virginia cucurbit producers could save \$100,000 on unnecessary fungicide applications annually. Cucurbit downy mildew information and alerts are routinely posted on the Virginia Ag Pest Advisory and sent to ANR agents.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems

Outcome #19

1. Outcome Measures

Using Virginia's Potato Disease Advisory to reduce pesticide applications and increase profitability for potato producers.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Approximately 6,000 acres of Irish potato are produced on the Eastern Shore of Virginia annually. Disease management tactics are crucial to sustaining a successful and profitable production system. Potato disease development relies strongly upon environmental conditions that favor these pathogens. If conditions are optimal, disease can be severe and cause considerable crop losses. However, if conditions are not favorable, unnecessary fungicide applications can reduce producer profitability.

What has been done

The Virginia Potato Disease Advisory was initiated by the plant pathology program at Virginia Tech's Eastern Shore AREC in Painter, VA and the Northampton and Accomack County VCE offices. Weekly disease advisories containing fungicide recommendations and pertinent information about potato diseases are generated by the ESAREC and disseminated to growers through the VCE county offices.

Results

Funding for the Virginia Potato Disease Advisory was obtained through the Virginia Irish Potato Board for 2011. Ten weekly advisories were disseminated to 100% of the Eastern Shore of Virginia commercial potato producers. In 2011, environmental conditions were not favorable for disease development until the latter portion of the season. On average 6 fungicide applications were spared through the implementation of the Virginia Potato Disease Advisory. Reduced fungicide applications constituted a savings of \$360,000 in unnecessary inputs for Eastern Shore

of Virginia potato producers. No severe outbreaks of potato diseases were reported within the region.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems

Outcome #20

1. Outcome Measures

Using integrated pest management techniques to reduce the spread of invasive weed species in the nursery industry

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Weed management is one of the most costly expenditures in nursery production and in landscape maintenance. Weeds are commonly managed through preemergence and postemergence herbicide application. Proper use of these chemical control options is needed for environmental stewardship, including minimizing any adverse impact on the Chesapeake Bay. Nonchemical control options needs to be integrated into management strategies used by producers and landscapers.

What has been done

Through my research program, I evaluated the integration of nonchemical and chemical control strategies for dovwweed reed, one of the newest invasive plant species in container nursery production. I evaluated control measures for chamberbitter, phyllanthus, and mulberryweed, three of the newest invasive weeds to infest nursery and landscape plantings in Virginia. Control strategies for yellow nutsedge, an aggressive weed in container and field nursery production as well as landscape maintenance was investigated. Results were published in one refereed journal article, five papers presented at professional meetings, and in 11 research reports. A research report containing seven articles on my findings were distributed to the attendees at the 2011

Virginia Turfgrass field day.

Results

Over 2,000 individuals were trained on the use of nonchemical and chemical control options. Attendees learned the benefits of nonchemical weed control options, resulting in fewer pesticide applications to lawns, landscape bed, and in production areas. Practitioners utilizing the results from my integrated research and extension program will increase the effective use of nonchemical weed control measures. This will result in a decrease in unnecessary pesticide applications.

4. Associated Knowledge Areas

KA Code	Knowledge Area
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #21

1. Outcome Measures

Using surveys, field trials and direct communications with growers and crop advisors to improve management of brown marmorated stink bug in Virginia soybean fields

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The brown marmorated stink bug, *Halyomorpha halys* (Stål) (BMSB) has been steadily spreading throughout the Mid-Atlantic area. According to a report by the USDA Animal and Health Inspection Service?Plant Protection and Quarantine, there is a ?high likelihood? that brown marmorated stink bug will continue to spread throughout the US. This is partly due to their wide host range, high mobility, and reproductive potential. Heavy BMSB infestations have occurred in Maryland soybean, and some are now in Virginia soybean fields. Growers want to know where this pest is located, its abundance, and how to control it both effectively and economically.

What has been done

In 2011, a statewide BMSB survey was conducted to evaluate the presence and impact of BMSB in soybean. Scouts sampled fields in 42 counties throughout Virginia from August 2 to October 10, 2011, making 240 field visits. Three replicated field experiments were conducted in soybean fields in Orange Co., VA, to determine the efficacy of selected insecticides against BMSB. Treatments were broadcast using a backpack sprayer in August, and sweep net samples were used to count adults and nymphs at multiple days after treatment. Plant samples were taken at maturity to determine the extent of yield loss and seed injury. Twelve fields, located in seven counties, where growers treated only the field edges with insecticide were selected to document the effectiveness of this management strategy. Growers were contacted for spray information and for permission to sample their field. Up to five post-treatment field visits were made to these fields; the number of BMSB (post-treatment) was determined using sweep net samples. Updates on the statewide BMSB survey, field efficacy trials, and edge treatment studies were posted to the Virginia Ag Pest Advisory on a weekly basis.

Results

From the statewide BMSB survey, the pest was first found on August 2 at growth stage R2 (full flower) or R3 (beginning pod) soybean in Orange and Fauquier Counties in low numbers well below economically damaging levels (less than 1 per 15 sweeps). There were 11 counties where BMSB densities exceeded suspected economic levels (Augusta, Campbell, Clarke, Culpeper, Fauquier, Frederick, Madison, Orange, Rappahannock, Spotsylvania, Stafford). There were 9 counties where BMSB were detected only in low numbers, ≤ 3 per 15 sweeps (Bedford, Caroline, Essex, Goochland, Middlesex, Nelson, New Kent, Rockingham, Shenandoah). BMSB were not detected in 22 surveyed counties (Accomack, Appomattox, Chesapeake, Dinwiddie, Gloucester, Greensville, Isle of Wight, King & Queen, King William, Lancaster, Mathews, Northampton, Northumberland, Pittsylvania, Prince George, Richmond, Southampton, Suffolk, Surry, Sussex, Virginia Beach, Westmoreland). Roughly, BMSB were located in soybean fields in counties along the Interstate 81 corridor and north of Interstate 64. Results of field insecticide trials showed that several products currently labeled for use in soybean were effective in reducing BMSB populations to nearly zero (e.g., Vydate L, Lannate LV, Cobalt Advanced, Belay when tank mixed with Kaiso 24WG or Baythroid XL, Baythroid XL, Orthene 97, Endigo ZC, and Brigade 2EC). Follow-up sampling in edge-treated fields showed that growers saved time and money by only treating for stink bugs along the perimeter rather than the entire field (field sizes ranged from 50-400 acres). Applications were made by growers in late August or September. Most insecticides provided season-long very good to excellent control of BMSB (i.e., Lambda, Acephate 97UP, Sniper, Sniper + Warrior, Bifenthrin, and Endigo), with most fields having zero to less than one BMSB per 15 sweeps after treatment.

4. Associated Knowledge Areas

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

Outcome #22

1. Outcome Measures

Implementing new practices for protecting the ornamental horticulture industry from box blight disease

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Box blight is a new disease that was recently found in North Carolina in late October 2011. It has recently been found in seven other states (CT, MA, MD, NY, OR, IR,VA) although the number of infested locations within each state is limited. In Virginia, this disease was found in two production fields bordering North Carolina. This disease has already devastated some horticultural businesses. At risk are not only the multibillion-dollar horticulture industry but also many historical gardens and landscape establishments in Virginia and throughout the country should this disease spreads.

What has been done

To minimize its damage, I have been working relentlessly with the industry, regulatory agencies, science communities here and overseas to develop effective containment strategies for immediate impact and research plan for long-term solutions to this emerging disease. Major activities were as follows. First, I co-authored one extension publication on the diagnosis and biology of this disease. Second, I brought regulatory personnel and ornamental pathologists together from CT, NC and VA where this disease were first found and hosted a web conference on December 22, 2011. A total of 15 scientists attended the conference and collectively developed short-term control strategies and a research plan as well as mechanisms to coordinate research and extension activities. The group is scheduled to meet again within 2 months. Third, I proposed and added a new session (box blight) to the Mid-Atlantic Horticulture Short Course, a regional educational program, to be held in Newport News, Virginia from January 29 to February 2, 2012. I will be leading this session on January 30 from 10:45 to 11:45 AM to educate the growers, landscapers and retailers on the biology, diagnosis and control of this disease. Fourth, I led with a colleague from NCSU an information session on box blight at the Mid-Atlantic Nursery Trade Show in Baltimore on January 10, 2012. Approximately 250 people, which was 100 more

than anticipated, attended the meeting. Based on the literature review and personal communication as well as my own analyses, I assured the group that this disease is manageable. I also developed and presented the current best strategy for protecting individual business and the horticulture industry as a whole from box blight at this stage of disease development. In addition, I outlined the chemical control options as well as what we planned to do in search for long-term solutions to this emerging disease problem. A research proposal has been sent to the funding agency. Fifth, I have been developing an general guideline on the best management practices for avoidance and mitigation of box blight in wholesale nurseries.

Results

These activities synthesized and disseminated current knowledge on box blight. They prepared growers and other horticulturists with disease diagnostic tools, risk avoidance and mitigation strategies. Some of my recommendations on the best management practices such as restricted access to boxwood production area on the property is now a standard practice at Saunders Brothers, Inc. as posted on its website <http://www.saundersbrothers.com/index.cfm/fuseaction/home.showpage/pageID/152/index.htm> and other nurseries. These BMP recommendations will help reduce the box blight damage in Virginia and nationwide to the minimum.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems

Outcome #23

1. Outcome Measures

Providing pest identification and IPM materials via the Virginia Tech Plant Disease Clinic to increase adoption of IPM practices by homeowners and producers across Virginia

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Non-commercial growers, commercial crop producers and lawn/landscape professionals require accurate diagnosis of their crops? disease and abiotic problems (e.g. chemical injury, environmental stress, cultural problems) in order to implement appropriate pest management tactics. Commercial growers also must avoid crop loss and poor crop quality to ensure profitability. Accurate diagnosis is the foundation for healthy lawns, landscape and crop production and for development of integrated pest management programs and aligns with the College of Agriculture and Life Sciences' Agricultural and Environment Sustainability initiative.

What has been done

The Virginia Tech Plant Disease Clinic (PDC) is a service lab to Virginia Cooperative Extension (VCE) agents, providing diagnosis of plant disease and abiotic problems for Virginia clientele whose samples are submitted through their local VCE agent. For each sample diagnosed, an electronic diagnostic report is prepared. When relevant, PDC report recommendations include alternative control tactics (non-chemical) to avoid or minimize the problem identified. In cases where it is too late to apply a pesticide, a pesticide is not likely to yield an economic benefit or where alternative control tactics alone would be effective, growers are advised not to apply a pesticide. In cases where pesticides are warranted, the report includes information on appropriate pesticide(s) and application times for effective disease control. Thus, pesticide use is implemented when it will be most effective and avoided in cases where it would be not be beneficial.

Results

The PDC received 1,275 samples in 2011 and diagnosed 1,450 plant problems. Additionally, 114 phone and 71 email inquiries were answered and 89 digital diagnoses were made. To evaluate impacts of the PDC diagnostic services, electronic surveys were sent post-season 2011 to PDC clients who included email addresses on diagnostic forms. Response rates from the three surveys (three grower groups) were 25% non-commercial growers, 40% landscape/lawn professionals and 33% commercial growers. Some highlights of the survey results include:

? Non-commercial growers (73%/18%), landscape/lawn professionals (56%/44%) and commercial growers (88%/6%) strongly agreed/agreed with the statement, ?I value the services provided by the Plant Disease Clinic.?

? Thirty-three percent of landscape/lawn professional, 29% of commercial grower and 23% of non-commercial grower respondents reported reduced pesticide use through use of the PDC diagnostic services.

? Approximately half of all respondents from each grower category reported that PDC services ensured they only used appropriately labeled pesticides.

? Increased profitability and crop quality were reported by 53% and 65% of commercial grower respondents, respectively, through use of PDC services.

? Seventy-six percent of commercial grower respondents agreed that use of PDC diagnostic services allowed them to develop a more strategic integrated pest management approach in their operation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations

Brief Explanation

Cuts in federal funds and program support affected pesticide safety education and IPM programming. Drastic cuts in both programs affect our future ability to maintain programs to federal standards. Faculty in the Department of Entomology have been successful in obtaining funding for research on the brown marmorated stink bug including USDA/NIFA and national and state commodity boards.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

- Surveys were conducted after most pesticide safety education/IPM educational programs. Evaluation results were used to improve educational media, program delivery, and to assess other audience (stakeholder) needs.
- Surveys were included with all training manuals to offer users an opportunity for input into the quality and efficacy of our 22 training manuals. Responses were minimal thus very little impact was measured from this method.
- Surveys and direct feedback opportunities were included in all online educational courses. Responses were minimal thus (again) offering very data for measuring quality and impacts.
- iClickers (audience response technology) was implemented into the program in 2011. One kit of 50 iClickers and a system hub was offered to Extension agents for use in their programs. Two agents used them as a result of holding an agent in-service training on their use. Adoption will be slow as agents discover the value of this technology. Feedback has been excellent from those who did use the kit in 2011.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 14

1. Name of the Planned Program

Global Food Security and Hunger - Plants and Plant Products

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	15%	10%	10%	33%
201	Plant Genome, Genetics, and Genetic Mechanisms	10%	15%	15%	0%
202	Plant Genetic Resources	10%	10%	10%	0%
205	Plant Management Systems	10%	10%	10%	67%
216	Integrated Pest Management Systems	15%	15%	15%	0%
403	Waste Disposal, Recycling, and Reuse	10%	10%	10%	0%
511	New and Improved Non-Food Products and Processes	10%	10%	10%	0%
601	Economics of Agricultural Production and Farm Management	10%	10%	10%	0%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%	10%	10%	0%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Actual Paid Professional	27.5	2.5	29.5	4.0
Actual Volunteer	2853.0	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
289933	148372	554967	773709
1862 Matching	1890 Matching	1862 Matching	1890 Matching
961114	274008	1598605	849726
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2433047	325000	6439245	242283

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research experiments on genetic improvement and manipulation of plants, bioprocessing, production systems, and BMP effectiveness. Contribute presentations and scholarly publications to regional, national, and international scientific organizations. Engage with clientele to adapt research products to the production environment. Conduct multi-county and in-depth educational programs and short courses on new plants and plant products, their management, food safety issues, and associated BMPs. Collaborate with other state specialists to develop regional publications in these areas. Maintain demonstration plots of cultural practices, techniques and germplasm adaptability of selected crops. Publish (listserv, web, and mailing) newsletters to provide practical information on pest management, cultural practices, and other research-based aspects of plant management.

2. Brief description of the target audience

The target audience includes the scientific community, Extension educators, commercial producers, policy makers, small businesses, pesticide applicators, homeowners and other plant and food product consumers. Youth, their parents, and limited income consumers are targeted through 4-H horticulture programs and community gardening efforts.

3. How was eXtension used?

Extension Master Gardeners are actively using the eXtension Ask-an-Expert system to respond to clientele questions. A few faculty serve as experts in answering questions posed on the Ask-an-Expert system.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	203383	290671	34660	388

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

Patent Applications Submitted

Year: 2011

Actual: 2

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	10	33	43

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of plants and plant products educational presentations conducted

Year	Actual
2011	983

Output #2

Output Measure

- Number of plants and plant products volunteers

Year	Actual
2011	2853

Output #3

Output Measure

- Number of plants and plant products research citations

Year	Actual
2011	33

Output #4

Output Measure

- Number of plants and plant products extension/outreach citations

Year	Actual
2011	259

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase the number of commercial producers educated about new plants, cultivated varieties, production techniques or BMPs
2	Increase the number of noncommercial gardeners/producers educated/adopting about new techniques or BMPs
3	Number of new cultivated varieties released
4	Increased number of acres dedicated to vegetable and berry specialty crops to enhance agricultural profitability.
5	Increase in the number of commercial producers educated about the reuse, recycling and utilization alternatives for waste products and agricultural plastics.
6	Increase the yield, input efficiency (fertilizer, fungicides, insecticides, herbicides, irrigation, etc.), and profit for Virginia vegetable farmers.
7	High Tunnel Ginger Increases Small Farm Profitability in Virginia
8	Development of Vegetable Soybean-based Agribusiness in Southside VA

Outcome #1

1. Outcome Measures

Increase the number of commercial producers educated about new plants, cultivated varieties, production techniques or BMPs

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	400

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Virginia Flower Growers Association's (VGFA) Greenhouse Operator's Training Manual was developed in the mid-90s as a statewide certification program for greenhouse industry professionals. The training was self-directed and certification required passing an exam that was administered by a member of the VFGA Board of Directors or the VFGA educational advisor, who was Mr. Jimmy Mullins at Virginia State University at that time. In 2003, Drs. Latimer and Scoggins undertook a major revision (3rd edition) of the manual which increased the content and presented the information in an Extension format. Subsequently, the Virginia Department of Education accepted the successful completion of the VFGA Greenhouse Operator's Certification program as a verified credit for high school graduation. Drs. Latimer and Alan McDaniel developed training materials for the vocational education teachers since they were required to pass the exam prior to teaching the material to their students. Since the 2003 revisions to the manual were intended to provide education to existing greenhouse operators, many of the sections were written with less basic or scientific background than necessary for high school students. And, some topics were omitted altogether. An increasing number of high school students take the certification exam annually, 310 in 2011 which is up significantly from the 133 in 2008 (when coordination of the testing was moved to VT). In addition to its use in Virginia high schools, the manual has been used in greenhouse management classes at the University of Georgia and in community colleges in Texas and Washington. The manual needed updates in content and format to meet the needs of educators.

What has been done

The process of updating the manual in Fall 2010 with an expanded outline of topics and list of suggested new authors to update/revise existing chapters to improve scientific background of the content.

Results

For the 4th edition, chapters were added on how to get started in the business, greenhouse vegetable production and best management practices. We found new authors to rewrite topics like greenhouse budget basic, media selection and plant propagation to make these more student friendly. We utilized our graduate students in updating chapters in their areas of expertise. The revision was completed in October 2011 with 22 authors preparing 37 chapters with a total page count of about 500. Currently the 150-page study guide is being edited with sample test questions to match the updated manual. The Study Guide will be available in February 2012.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
205	Plant Management Systems
216	Integrated Pest Management Systems
403	Waste Disposal, Recycling, and Reuse
601	Economics of Agricultural Production and Farm Management
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #2

1. Outcome Measures

Increase the number of noncommercial gardeners/producers educated/adopting about new techniques or BMPs

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	1200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Over 1,000 Master Gardener (MG) volunteers provide research-based horticulture and environmental educational programs through Virginia Cooperative Extension (VCE) in the 19 county Northern District (ND). According to a 2007 University of Minnesota MG study of potential public benefits, the identified top three were improving the natural environment, reduction of the spread of hazardous plants, insects and disease, and an increase in the effectiveness of community public service organizations. In Prince William County, Public Works?

What has been done

In 2011, Prince William County MG volunteers and staff educated 972 residents through 51 classes held free to the public. Some of the class topics included the Basics of Gardening Series, the Sustainable Vegetable Gardening Series, Pruning, Teaching Garden Tours, six Saturday in the Garden programs, and four classes on lawn care.

Results

As a result of these programs, 90% of attendees returning surveys reported the intent to adopt recommended water quality practices provided in the lectures on post surveys. Surveys sent out to the same attendees three months after these programs indicate that 87.5% of environmental education participants had adopted the recommended best management practices provided in the lecture they attended.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
216	Integrated Pest Management Systems
403	Waste Disposal, Recycling, and Reuse
511	New and Improved Non-Food Products and Processes

Outcome #3

1. Outcome Measures

Number of new cultivated varieties released

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The PVQE is a key step towards development and release of Virginia-type peanut for Virginia, North Carolina, and South Carolina. In the PVQE small- and large- plot tests, our research group comparatively evaluate performance of all commercial varieties presently grown and a variable number of advanced breeding lines developed by North Carolina State University and Virginia Tech. These peanut genotypes are compared under optimum growth conditions and management practices for yield potential, grade and quality characteristics. As a result of this activity, one or two of the best performing peanut lines are released as new varieties every year. Research shows that location and year have a significant effect on lines' performance; therefore, replicated test plots are conducted at multiple locations and for at least three years before cultivar release. The PVQE is a multi-state project funded by the Virginia Tech, North Carolina State University, V-C Peanut Association, and the SC Peanut Growers; it addresses the CALS mission to increase profitability and environmental sustainability through development of better adapted and better yielding peanut varieties for V ? C region.

What has been done

Because its effectiveness in development of Virginia-type peanut varieties, the PVQE project has been around for over 35 years. Because of its importance, the PVQE was extended in the past few years to include South Carolina through collaboration with researchers and extension agents at Clemson University. Results of the PVQE project are equally used by breeders, researchers, growers, shellers and peanut processors, and constitute a base for education of county agents, growers and industry on varietal selection. Educational activities include various field days and presentations at professional and non-professional meetings every year. Over the years, a number of peanut varieties were released by Virginia Tech through this program. They are widely grown in V ? C region: NC-V 11, Wilson, VA ? 98R, CHAMPS and, more recently, Titan. Titan was released in 2010. This way, not only that financial contribution of the project's participants is secured, but additional dividends are annually collected for the university, Tidewater AREC, and the PVQE & Crop Physiology program.

Results

Field trials in Virginia, North Carolina, and South Carolina were planted this year at six locations. Each trial had 28 genotypes of peanut replicated 3 times. The 2011 results of the PVQE trials are distributed to over 200 participants. Based on these results, decisions on what varieties to be planted in the following year and what new varieties to be released are formulated.

4. Associated Knowledge Areas

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

201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #4

1. Outcome Measures

Increased number of acres dedicated to vegetable and berry specialty crops to enhance agricultural profitability.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	120

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Eastern Shore of Virginia traditionally has been a major supplier of fresh and process vegetables to key markets located in the northeast. Due to changing market needs, availability of hand labor and other economic factors this area has transitioned to crops which can be mechanically harvested which has placed additional emphasis on larger commercial producers for the production of these specialty crops. Economic conditions, primarily transportation cost, have resulted in an increased interest by produce entities to locate producers in closer proximity to existing eastern markets. This has created the opportunity for smaller operations to participate in a new specialty program which may be an attractive addition to their operations and potentially increase profitability for these producers.

What has been done

In cooperation with the VDACS, we have had the opportunity to meet with several of these operations, discuss potential for production of these crops on the Eastern Shore. In some instances these crops are not viable for this area, but in many cases we have been able to introduce new crops to our area which are produced on a regular basis in Accomack and Northampton Counties.

Results

In 2011 we were able to connect with Hillside Gardens, LTD of Canada in regard to the potential for carrot production on the Eastern Shore. Several meetings both in person and electronically were held to discuss this potential. Specialists at the Eastern Shore AREC were included to address issues of disease, fertility, weed and insect control. Dr. Josh Freeman, Vegetable Specialist at the ESAREC will also be conducting trials and be working with producers directly as this program proceeds.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
202	Plant Genetic Resources
205	Plant Management Systems
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #5

1. Outcome Measures

Increase in the number of commercial producers educated about the reuse, recycling and utilization alternatives for waste products and agricultural plastics.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	250

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Disposing of used plastic pesticide containers in a manner that does not threaten the environment poses a challenge for agricultural producers and custom applicators. Typically, pesticide applicators dispose of their empty, clean plastic pesticide containers by hauling them to the local landfill. Local drop-off points for pesticide container recycling allow farmers an economical and

environmentally-friendly alternative.

What has been done

In 2011, a local drop off point in Isle of Wight County was maintained to provide an alternative to the local landfill for farmers to dispose of their used plastic pesticide containers. This program was promoted through local newsletters and other correspondence with local farmers. In addition, a grant of \$1,875.00 was received from the Virginia Department of Agriculture and Consumer Services to provide support of pesticide programs in Isle of Wight.

Results

As a direct result of this program, 6500 plastic pesticide containers were collected from Isle of Wight County in 2011. These containers were shredded during the summer and fall to be recycled into other useable plastic products.

4. Associated Knowledge Areas

KA Code	Knowledge Area
403	Waste Disposal, Recycling, and Reuse
601	Economics of Agricultural Production and Farm Management
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #6

1. Outcome Measures

Increase the yield, input efficiency (fertilizer, fungicides, insecticides, herbicides, irrigation, etc.), and profit for Virginia vegetable farmers.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	150

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Peanut pod blasting has been determined to be a very effective method of determining the maturity level of peanuts to aid as a tool in harvest decisions and timing of digging procedures.

What has been done

A peanut pod blasting session was held in Newsoms, VA in late September to blast over 30 samples of various varieties of peanuts for 14 area peanut farmers. Samples were pulled, blasted, and laid on maturity charts to determine maturity levels.

Results

Most samples were determined to be 10 to 14 days from optimum maturity with some of the samples being ready for digging and some of the samples being 21 days from maturity. Proper timing of digging can increase yields up to 400 pounds per acre and at 30 cents per pound can lead to increased revenue of \$ 120.00 per acre.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
205	Plant Management Systems
216	Integrated Pest Management Systems
403	Waste Disposal, Recycling, and Reuse
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #7

1. Outcome Measures

High Tunnel Ginger Increases Small Farm Profitability in Virginia

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia small growers remain competitive in crowded farmers markets when they offer customers new specialty crop introductions. Ginger is treasured internationally for its culinary and medicinal properties. Ginger is a tropical plant and requires an 8 to 10 month growing season from planting to harvesting and it is difficult to grow ginger under field conditions in Virginia. Ginger can be grown under high tunnel conditions. High tunnels are a simple and inexpensive structure that farmers can use to extend their growing seasons. High value specialty crops such as ginger are ideal for protected culture. Local demand for locally grown ginger is high. Currently 100% of ginger consumed by Virginia consumers is imported from China, Brazil and the Central American countries.

What has been done

In response to the market demand for locally grown ginger, a grant was obtained from the Virginia Department of Agriculture and Consumer Services (VDACS) and in collaboration with two small growers; two high tunnel grown ginger demonstration sites were established. Seven month after planting, these growers were able to start harvesting and marketing their ginger to local markets

Results

As a result of this program, over 1,300 pounds of fresh local ginger was harvested from participating farmer high tunnel structures. The harvested ginger earned participating growers over \$7,800 in gross sales. Ten interested growers were provided ginger rhizomes to plant and market. Participating farmers reported a positive consumer response and demand exceeded supply. Educational outcomes of this program are a how to video was produced and 300 copies of a Ginger production and marketing bulletin, and recipes were published and distributed. One Ginger field day was hosted in Cologne, VA with 100 attendees.

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Development of Vegetable Soybean-based Agribusiness in Southside VA

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Current US demand for vegetable soybean (edamame) exceeds supply and a significant portion of what is sold and consumed locally is imported from China and Taiwan. For Virginia farmers, edamame promises higher income than regular soybean for the same inputs and labor. Because edamame is a high value specialty crop marketed as a healthy and functional food, it is particularly suited to smaller acreages like the family owned tobacco farms in Southside Virginia.

What has been done

Researchers introduced three VSU edamame varieties in Southside VA and provided training on production, postharvest handling, and marketing. During the 2010 and 2011 cropping seasons, a total of 5.5 acres were put under edamame in four counties (Dinwiddie, Sussex, Buckingham, and Halifax).

Results

As part of postharvest handling, a portion of the 2010 crop was processed by a family in Halifax County. The family was able to develop a delicious and high quality product. Preservation in jars was done at a certified community kitchen established with support from Virginia Cooperative Extension. The product was distributed for testing among program participants and other members of the community. Preparations are being made by the family in cooperation with The School of Agriculture at VSU, for distribution and sale of the processed product starting from the 2012 growing season.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy

Brief Explanation

The relatively poor economic situation still affects agricultural products in general and especially the ornamental sector of horticultural crops.

Some parts of Virginia were significantly affected by Hurricane Iren in August 2011. This had severe effects on the agricultural industries in the affected areas.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

No formal evaluations were conducted.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 15

1. Name of the Planned Program

Sustainable Energy

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	10%	10%	10%	0%
124	Urban Forestry	10%	10%	10%	0%
132	Weather and Climate	10%	10%	10%	0%
206	Basic Plant Biology	10%	10%	10%	0%
402	Engineering Systems and Equipment	10%	10%	10%	0%
403	Waste Disposal, Recycling, and Reuse	10%	10%	10%	0%
511	New and Improved Non-Food Products and Processes	10%	10%	10%	100%
601	Economics of Agricultural Production and Farm Management	10%	10%	10%	0%
605	Natural Resource and Environmental Economics	10%	10%	10%	0%
610	Domestic Policy Analysis	10%	10%	10%	0%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	10.9	0.5	5.4	0.0
Actual Paid Professional	2.1	0.5	2.3	0.0
Actual Volunteer	7.0	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
22515	114423	43097	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
74637	94886	124142	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
188942	0	500050	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conducted research and extension programming that explored **applied research** and provided education on issues related to renewable energy systems, energy efficiency, energy feedstock cultivation, efficient harvesting and storage of biomass, network analysis to optimize logistics and minimize delivery costs, and exploration of the consequences of specific policy initiatives. This program included 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.

2. Brief description of the target audience

Commercial Producers
Researchers
 Land Owners
 4-H Youth
 K-12 Youth
 State and Federal Agency Personnel
 Extension Educators
 Policy Makers
 Farmers
 Consumers
 Ag Related Businesses
 Energy Service Companies (ESCOs)

3. How was eXtension used?

The "Ask an Expert" feature of eXtension was used to field and manage diverse inquiries regarding renewable energy. Additionally, clients were often routed toward specific eXtension webpages for additional information, resources, and/or notices on upcoming events (e.g., webinars, etc.)

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1694	2325	3	0

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	0	3	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Train the Trainer and Inservice Energy Workshops

Year	Actual
2011	27

Output #2

Output Measure

- Number of On-farm Demonstrations

Year	Actual
2011	5

Output #3

Output Measure

- Bioenergy Featured Case Studies

Year	Actual
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2011

12

Output #4

Output Measure

- Developed basic and applied information related to sustainable energy through targeted research programs

Year

Actual

2011

0

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 the number of individuals using energy more sustainably
3	Increase the number of sustainable energy products
4	Percent increase in the optimization of logistics management for sustainable energy systems
5	Increase number of enterprise budgets related to sustainable energy development
6	Characterization of Genes that Regulate Wood Formation and Biomass Accumulation
7	VCE fills the need for tobacco barn heat exchanger testing.
8	Flue-Cured Tobacco Curing Efficiency - Impact of Proper Barn Pad Insulation
9	Flue-Cured Tobacco Curing Efficiency - Evaluation of Novel Heat Exchanger Technology for Flue-Cured Tobacco
10	Sweet hydrogen and sugar fuel cell vehicles
11	Biomass conversion
12	Enzymatic synthesis of renewable materials
13	Big picture for the sustainability revolution
14	High-power and high-energy density enzymatic fuel cells (i.e., bioinspired sugar battery).
15	Cellulase engineering, metabolic engineering, and consolidated bioprocessing <i>Bacillus subtilis</i>
16	Low-cost recombinant protein production and purification as building blocks and synthetic metabolons for cascade enzyme factories and microbial cell factories.
17	Inventorizing Residual Biomass to Identify Opportunities for New Revenue Streams in the Commonwealth.

18	The Bioenergy Engineering Education Program (BEEP)
19	Virginia Boiler Database and Facility Biomass Resource Assessments Reports
20	VCE HAMPTON TEAMS WITH LANGLEY NASA AND THE CITY OF HAMPTON TO BRING BIOCHAR TO THE PUBLIC
21	Appalachian Regional Initiative for Environmental Science
22	A Systems Biology Approach to Cellular Regulation of Seed Filling
23	Balancing bioenergy benefits with the risk of invasiveness
24	Biomass Energy Fuel Characterization and Pilot Stack Emission Testing Program
25	In vitro dynthetic three-enzyme complex facilitated metabolite channeling
26	Waste Solutions Forum
27	Enhancing on-farm biogas production from dairy manure
28	Program for identifying new biofuels and their synthetic routes
29	Identification of metabolic engineering targets for biofuels production
30	Energy Efficiency Education Program helps low-income renters save money and energy
31	Utilizing Locally-produced Canola to Manufacture Biodiesel

Outcome #1

1. Outcome Measures

Increase farm profitability due to more energy efficient practices

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Soaring energy costs affect every area of a community and have caused community leaders to seek guidance from researchers and Extension. Based on 2007 data, farms in Southside and Southwest Virginia spent over \$58 million in fuel and \$16 million in electricity and other utilities, spending nearly \$75 million in total. Energy management is key to reducing soaring energy costs and increasing agricultural profits.

What has been done

Virginia Cooperative Extension submitted and received a grant from the Virginia Tobacco Indemnification & Community Revitalization Commission in January 2010 to begin a new pilot program for Southside and Southwest Virginia farmers interested in energy efficiency improvements. This program a) raises awareness of opportunities to improve energy efficiency resulting in reduced production costs; b) assists farmers in conducting an on-farm energy assessment to identify energy savings opportunities specific to their operation; c) provides financial incentives to upgrade to energy efficient equipment and systems identified by the energy assessment; and d) provides energy efficiency resources required to pursue renewable energy and energy efficiency grants and subsidized loans through the USDA Rural Energy for America Program.

Results

Since January 2010, 57 farms requested energy audits exceeding the project goal to audit 30 farms. Of those farms, 41 have been completed, 4 audits remain in progress, and 12 farms withdrew from the program. Farms in 16 counties throughout Southside and Southwest Virginia participated in the program. Counties included Amelia (2), Brunswick (3), Buckingham (2), Campbell (2), Carroll (2), Cumberland (2), Dinwiddie (7), Floyd (1), Franklin (3), Lunenburg (3), Mecklenburg (11), Nottoway (2), Pittsylvania (10), Prince Edward (1), Smyth (1), and Washington (2).

As of October 2011, completed audit reports identified farm specific energy conservation measures to save: a) 882,952 (kWh) in electrical usage; b) 464,488 (gallons) propane fuel; c) 19,336 fuel oil; and d) \$900,447 in annual energy related expenditures of which 70 percent of these measures have a payback period shorter than 5 years. Additionally, the identified energy conservation measures have the potential to reduce net greenhouse gas emissions by approximately 3,323 MTCO₂e.

A 25 percent cost share reimbursement option was offered to each farm completing the energy audit. Ten (10) farms submitted a request and received approval for the cost share. The local Extension agent is always notified regarding any communication with the farmer.

Farms completing an energy audit were well positioned to apply for the USDA Rural Energy for America Program. In 2010, three (3) USDA REAP proposals were awarded, and 2 were part of the Energy Efficiency program. However, in 2011, 40 USDA REAP grant applications were received with 34 Virginia farms receiving an award. Among the successful applications, 9 farms were part of the On-Farm Energy Efficiency program and 3 audited farms were not funded.

Because of On-Farm Energy Efficiency project, 3 farm-based educational programs were offered focusing on agricultural related on-farm energy efficiency improvements. Virginia now has 12 data collectors trained to assist farm energy auditors and provide technical support to farms when needed. Furthermore, Virginia has an energy auditor in Farmville, Virginia, and access to an audit firm in Vermont and Mississippi. Farmers have access to a grant writer to oversee the writing and preparation of grant applications. Agents, farmers, and data collectors also have 2 infrared cameras available for use on Virginia farms.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Increase the number of individuals using energy more sustainably

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Increase the number of sustainable energy products

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Percent increase in the optimization of logistics management for sustainable energy systems

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Increase number of enterprise budgets related to sustainable energy development

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Characterization of Genes that Regulate Wood Formation and Biomass Accumulation

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	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 with an estimated value, in 2004, of \$243 billion in U.S. sales (DOE, Industrial Technologies Program, Fiscal Year 2004 Report). 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 determines the physical properties of woods and hence their suitability for specific applications. Remarkably little is known about the genetic mechanisms that regulate wood formation.

What has been done

My laboratory 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. By exploiting these resources, we recently identified all of the Arabidopsis genes expressed in xylem and we are now in the process of determining the function of selected regulatory genes. Additionally, we are translating our

findings with Arabidopsis to poplar, a model for forest products research that was the subject of a recently completed genome sequencing effort. For the poplar work, we are supported by a feedstocks genomics grant from the DOE to study poplar protein-protein interactions relevant to wood formation.

Results

We 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 fate in the xylem, and two genes that regulate light intensity-dependent biomass accumulation. We have cloned 370 genes involved in wood formation in poplar. These are being used to identify protein-protein interactions important to wood formation <http://xylome.vbi.vt.edu/>. 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
206	Basic Plant Biology

Outcome #7

1. Outcome Measures

VCE fills the need for tobacco barn heat exchanger testing.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Tobacco-specific nitrosamines (TSNAs) are considered to be a group of the most potent carcinogens found in tobacco and are formed in the flue-cured process by interaction of nitrous oxides (NOx) produced as a by-product of combustion of LP and alkaloids present in the tobacco. The use of indirect-fired heating, where a heat exchanger removes the combustion gases from the barn, reduces TSNA content. Original retrofits of existing barns were done around 2003 and over time, cracks can form in heat exchangers, resulting in leaks and NOx interaction with the

tobacco. During the 2011 season tobacco purchasing companies began contracting Virginia's tobacco growers requiring them to have their bulk tobacco curing barns tested for heat exchanger integrity to insure proper operation.

What has been done

Extension Tobacco Specialist and Agents with tobacco responsibilities stepped up to provide the tobacco growing community with barn testing. Throughout the tobacco growing region of Virginia, 330 bulk tobacco curing barns were tested at no cost to the growers, alerting them to the condition and operation status of the heat exchangers in the barns and allowing them to perform maintenance or repair if needed. While there are companies and grower's associations that will test barns for a fee, Virginia Cooperative Extension's efforts saved the tobacco growing community approximately \$11,550 in direct cost associated with barn testing.

Results

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Flue-Cured Tobacco Curing Efficiency - Impact of Proper Barn Pad Insulation

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Curing fuel is the second largest production expense for flue-cured tobacco growers behind labor. While growers have adopted various opportunities to mechanize their tobacco production, proper attention has only recently been given to the required to cure tobacco and the cost of curing.

There are between 2200 and 2400 bulk tobacco barns in Virginia and probably more than 90% of these have inadequately insulated concrete pads under the barns. This leads to substantial heat

loss from the barns resulting in excessive fuel consumption and increased curing costs.

What has been done

An on-farm research project was conducted in 2011 to evaluate the amount of heat loss from barns with four different pad insulation treatments and to determine their impact on curing efficiency.

Results

Soil temperature data collected under the test barns quantified the heat loss over the course of individual cures and for the duration of the curing season. Heat loss from the non-insulated barn was so great that the soil temperature under the barn closely followed the actual barn temperature. Curing efficiency was increased by 16% with the use of 1 or 2 inch thick foam insulation board. At a propane cost of \$1.80 per gal., this would amount to 3.6 cents per pound of tobacco cured. If all bulk tobacco barns in Virginia had adequate pad insulation, growers would reduce propane consumption by 920,000 gal. and save \$1.6M.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Flue-Cured Tobacco Curing Efficiency - Evaluation of Novel Heat Exchanger Technology for Flue-Cured Tobacco

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The curing of flue-cured tobacco is an energy intensive process and represents a substantial and increasing portion of the total cost of production. Curing barns utilize a heat exchanger to provide indirect-fired heating of the tobacco to prevent combustion gases from entering the curing air space. The most common barn used by Virginia growers utilizes a rather inefficient heat exchanger design that results in comparatively high fuel usage, resulting in excessive curing costs for the growers.

What has been done

A project initiated in 2010 and expanded in 2011 evaluated a novel heat exchanger design for flue-cured tobacco barns. This new heat exchanger is designed to reduce fuel consumption and improve curing efficiency. Additionally, specific design features of the new heat exchanger will substantially improve upon the structural integrity resulting in more reliable operation with less annual maintenance and repair. On-farm evaluations on the new heat exchanger were conducted on multiple farms in Virginia in 2011 to collect comparative curing efficiency data.

Results

Fuel consumption data reveal a reduction in propane usage with the new heat exchanger from 485 to 330 gal per cure. At last season's average price for propane of \$1.80 per gallon, this would represent a savings of \$270 per cure or \$2160 for the entire curing season. The total impact for Virginia growers utilizing this specific barn would be a reduction in fuel usage from 2.71 M gal. to 1.86 M gallons of propane per season for a financial savings of \$1.53 M.

4. Associated Knowledge Areas

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

Outcome #10

1. Outcome Measures

Sweet hydrogen and sugar fuel cell vehicles

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

To break the Thauer limit for natural hydrogen-producing microorganisms, we have achieved the production of theoretical yield hydrogen from hexose (i.e., 12 H₂ per glucose unit). Via it, we propose the use of sugar as a hydrogen carrier so to solve hydrogen storage challenge. The hypothetical sugar fuel cell vehicles would be the most energy efficiency vehicles. A small fraction of the USA biomass could be sufficient to replace all gasoline.

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #11

1. Outcome Measures

Biomass conversion

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

We are investigating the complicated relationship among heterologous cellulose, cellulases, cellulosomes and cellulolytic microorganisms. For example, we find out that increasing substrate accessibility is more important than removing lignin for biomass pretreatment [8]. Displaying minicellulosomes on the surface of microorganisms can expedite microbial cellulose conversion rate by several folds.

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

Enzymatic synthesis of renewable materials

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

For the first time we are able to convert beta-1,4-glucoisidic bond linked cellulose to alpha-1,-4-bond linked starch as we dream long before. Synthetic polysaccharides would have a lot of applications, such as drug carriers, food additive, etc.

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

Big picture for the sustainability revolution

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

I wish to suggest constructing the electricity-carbohydrate-hydrogen (ECHO) cycle could meet four basic needs of humans: air, water, food and energy, while minimizing environmental footprints. In it, electricity is a universal high-quality energy carrier; hydrogen is a clear electricity carrier; and carbohydrate is a hydrogen carrier, an electricity storage compound and sources for food, feed and materials. By using this cycle, we could replace crude oil with carbohydrates (CH₂O), feed the world, power cellular phone, produce plenty of renewable materials and liquid biofuels (e.g., ethanol, butanol, jet fuel), etc. We conduct our research project based on two platforms: cascade enzyme factories, which is coined by me, and microbial cell factories (e.g., E. coli and Bacillus subtilis).

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #14

1. Outcome Measures

High-power and high-energy density enzymatic fuel cells (i.e., bioinspired sugar battery).

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

To increase fuel utilization efficiency, we have designed the pathways that can produce 24 electrons per glucose for the first time. Now we validate its feasibility.

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #15

1. Outcome Measures

Cellulase engineering, metabolic engineering, and consolidated bioprocessing *Bacillus subtilis*

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

We have developed a novel enzyme screening platform based on solid cellulosic materials and created the first really recombinant cellulolytic microorganisms that can grow on solid cellulosic materials based on its recombinant cellulases without help of other soluble nutrients.

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #16

1. Outcome Measures

Low-cost recombinant protein production and purification as building blocks and synthetic metabolons for cascade enzyme factories and microbial cell factories.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
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2011

0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Enzymes and their complexes would be key tools for biocatalysis.

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #17

1. Outcome Measures

Inventorying Residual Biomass to Identify Opportunities for New Revenue Streams in the Commonwealth.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Whether due to worries of rising energy prices, climate change, or energy security issues, many citizens are concerned that our nation has become too dependent on foreign sources of petroleum and are troubled by the impacts that this dependence has created. In response to these issues, the federal government signed into

law the Renewable Fuels, Consumer Protection, and Energy Efficiency Act of 2007. This act seeks to move the United States toward greater energy independence and security and promote the production of renewable fuels. Additionally, the commonwealth announced in the 2010

Virginia Energy Plan a target of making Virginia the energy capital of the east coast by increasing in-state production of energy by 20 percent over the next 10 years. These policies are indicative of a broader interest to sustainably increase our energy independence while mitigating climate change. Virginians are particularly interested in evaluating the use of residual biomass as an integral component to future renewable energy production. Agricultural operations in Virginia are facing substantial structural changes and challenges due to rapid urbanization, intensified competition, and increased environmental regulation. Finding a novel way to utilize the byproducts created from agriculture and other sources has the potential to convert waste streams into revenue streams. This potential can be realized through developing new value-added products such as biofuels, bioenergy, biopolymers, compost, functional foods,

and pharmaceuticals. A variety of large-scale bioenergy projects are underway in Virginia. These range from co-firing woody biomass at large centralized power plants to anaerobic digesters supplying more than one megawatt of electricity to the grid. Projects of this nature are critical to Virginia achieving the goals set forth in the commonwealth's energy plan. However, there are also significant bioenergy project development opportunities at smaller scales, which in the aggregate can provide significant gains toward achieving the energy goals set forth by the commonwealth and while providing significant benefits to facility owners.

What has been done

Developing an economical way to convert undervalued byproducts into value-added products is a challenge faced by rural, scientific and industrial communities. Doing this requires a comprehensive inventory of the byproducts because the economic viability of the conversion process is significantly influenced by the availability of the byproducts, and by the cost of transportation and logistical management of those materials. Virginia Cooperative Extension is leading efforts to maintain a residual biomass inventory for the commonwealth.

Results

The statewide assessment work is completed and results from this survey have been incorporated into a report. To date, our expanded network has led to multiple inquiries soliciting details of the residual biomass project. These requests have been made by watershed management planners seeking a comprehensive dataset to assess the distribution of residual biomass (and nutrients) within a particular area, entrepreneurs considering siting new businesses near abundant residual biomass sources, and researches assessing the feasibility of bioenergy projects in certain regions of the state. These early inquiries bode well for the utility of the collected data, specifically with regard to renewable energy, waste diversion, and the mitigation of greenhouse gases. Information from this assessment work was first released in 2010 as a text report. Work is underway to maintain, expand and update certain aspects of this database and create a queryable online geographic information system. This new format should enhance opportunities for Extension clientele to fully utilize the compiled information for the intended purposes of economic development, renewable energy systems and waste mitigation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
511	New and Improved Non-Food Products and Processes

Outcome #18

1. Outcome Measures

The Bioenergy Engineering Education Program (BEEP)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Whether due to worries of rising energy prices, climate change, or energy security issues, many citizens are concerned that our nation has become too dependent on foreign sources of petroleum and are troubled by the impacts that this dependence has created. In response to these issues, the federal government signed into law the Renewable Fuels, Consumer Protection, and Energy Efficiency Act of 2007. This act seeks to move the United States toward greater energy independence and security and promote the production of renewable fuels. Additionally, the commonwealth announced in the 2010 Virginia Energy Plan a target of making Virginia the energy capital of the east coast by increasing in-state production of energy by 20 percent over the next 10 years. These policies are indicative of a broader interest to sustainably increase our energy independence while spurring economic growth. The 2007 Energy Act received considerable attention in the spring of 2011 when oil topped \$112 a barrel, gasoline was well over \$3.50/gallon, and livestock/poultry industries were challenged by high feed prices. Policy makers, farmers, and citizens of Virginia are facing new economic development opportunities and making difficult decisions related to bioenergy project and policy development. However, it is often difficult for the citizenry to fully understand the complex terminology, and energy conversion processes, related to bioenergy. As a result, decision making and opinion forming often occurs with incomplete, misunderstood, or inaccurate information.

Results:

What has been done

Virginia Tech's Department of Biological Systems Engineering developed the Bioenergy Engineering Education Program (BEEP). The primary goal of this extension program is to increase participant's knowledge and awareness of the basics of bioenergy. Specifically, the

program seeks to inform participants on the many different forms of bioenergy, discuss the feedstocks typically used for the generation of bioenergy, and explain how the bioenergy conversion technologies actually work.

Results

Over the course of 2011, the materials from the BEEP program were presented to different and diverse audiences through presentations, workshops and field tours. Last year the BEEP program focused primarily on anaerobic digestion, poultry litter-to-energy technologies, and small-scale biodiesel production. These sessions were targeted to community leaders, entrepreneurs, farmers, K-12, and interested citizens alike. The common thread was to give participants basic information on bioenergy and to enable them to make informed decisions on the opportunities created through these bioenergy technologies. As a direct result of these educational efforts, several Virginia farmers are exploring manure to energy pilot projects for their farm in order to enhance their competitive advantage via the generation of renewable electrical and thermal energy and reduced bedding and fertilizer expenses. This represents the potential adoption of innovative bioenergy technology to help sustain Virginia farms, often while also addressing nutrient management concerns, which are vital component of Virginia's rural heritage and economy.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
605	Natural Resource and Environmental Economics
610	Domestic Policy Analysis

Outcome #19

1. Outcome Measures

Virginia Boiler Database and Facility Biomass Resource Assessments Reports

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2011, Virginia was selected as the "Top State for Business" by CNBC, indicating efficient infrastructure, talented workforce, lower costs of doing business, among other factors. To remain competitive Virginia businesses must explore all options to minimize production costs and to increase the marketability and value of their products and services. Energy prices are often volatile and energy-intensive industries are often exposed to energy price fluctuations. Furthermore, many consumers are placing a greater emphasis on the "greenness" or sustainability of certain products. Often fuel switching, from a fossil fuel to biomass, represents one opportunity to reduce energy costs while enhancing the overall sustainability, and often marketability, of the production process. To maintain this competitive advantage and spur economic growth how can Virginia institutions, agencies, and businesses identify opportunities to lower their operating costs?

What has been done

In 2010, a Virginia Tech team conducted ten biomass resource assessments for the US Department of Energy in the Western US. In fact in December 2011, these reports received a Southern Extension Forest Resources Specialists Silver Award for the National/International Project category. The project, titled "Wood Bioenergy Assessments in Support of the Department of Energy's Federal Energy Management Program, was judged by peers to be an exceptionally integrated, interdisciplinary effort with a protocol and products that should be replicated in other areas". The judges stated that this recognition "will hopefully lead to other efforts like this". Building upon this success, and lessons learned during the DOE field campaign of 2010, the Virginia Tech team sought ways to apply this approach to Virginia-based entities. Upon securing sponsored funding from the Virginia Department of Mines, Minerals and Energy, the VT Team began the initial assessment work for Virginia locations. The first step was to assess facilities with permitted boilers throughout Virginia. The Virginia Department of Labor and Industry (DLI) performs inspections of industrial boilers used in many large and small establishments, including hospitals, small offices, and large factories. Work focused on accessing, organizing, standardizing, and assessing boiler record information maintained by the DLI. The data was then be used to identify specific facilities that could be well suited for conversion to a biomass fired boiler. The metrics of the assessment consist of many factors, some of which are current fuel type, boiler size, boiler age, facility location, and any organizational policies promoting the use of renewable fuels. The second step was to identify Virginia businesses with Corporate Social Responsibility goals related to energy and greenhouse gasses. The third step was to begin the biomass resource assessments for the identified facilities. The feedstock assessment includes biomass sources appropriate for the given energy conversion technology, and typically includes sources of residual biomass, dedicated energy crops, and certain forest material.

Results

To date, 25,300 boiler records have been geocoded and entered into a Geographic Information System, and 7,874 Virginia business locations have been identified to have CSR goals related to energy and greenhouse gases. Upon completion in 2012, the findings of the biomass assessment reports will be reported to the facility managers, and aggregate information will be summarized in the final project report. While work is still underway, initial feedback has been very positive, with one business client indicating "From what you have shared, I expect that your output will be excellent support for our planning". By all indications, you are definitely on the right track, and we could not be more appreciative.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics
610	Domestic Policy Analysis

Outcome #20

1. Outcome Measures

VCE HAMPTON TEAMS WITH LANGLEY NASA AND THE CITY OF HAMPTON TO BRING BIOCHAR TO THE PUBLIC

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

?Biochar,? is the name for the charred biomass created from wood, plant material, and manure that has been used to improve soil fertility and remediate environmental contaminants - Agricultural Research Service. Biochar can be used as an abatement strategy to reduce increasing atmospheric levels of carbon dioxide (CO₂) by sequestering atmospheric CO₂ captured through photosynthesis in biomass and using pyrolysis to change it into a more stable form of carbon called biochar. Biochar can ?sequester? carbon from plant materials by storing it underground, where it slowly decomposes and makes only a minimal contribution to the emission of the greenhouse gas carbon dioxide- Agricultural Research Service. Scientist are using biochar to: produce fertilizers from renewable biomass, eliminate conventional fertilizer nitrate runoff into watersheds (a severe and growing water quality problem), increase soil organic matter accumulation from enhanced root growth, and to sequester carbon in soils.- Magrini-Bair et al., Annals of Environmental Science / 2009, Vol 3, 217-225. Using biochar to remediate environmental contaminants is an important priority for the City of Hampton to reduce the City?s Total Maximum Daily Load (TMDL) for the Chesapeake Bay as noted in the 2011 Community Plan Update. The plan also highlights as a goal to ?increase public awareness and engagement in the prevention of storm water pollution, and in protection and revitalization of wetlands and

natural habitats by 2014.

What has been done

The Hampton VCE horticulture program has teamed with the Langley NASA and the City of Hampton to bring comprehensive workshops on creating biochar in your own back yard. The workshop includes a class on carbon sequester and biochar, implications for it use to improve soil and water quality, a demonstration, and an information packet on how to create and use biochar in your own back yard.

Results

A demonstration site was created and is maintained by the Hampton VCE Master Gardeners. Classes have been offered onsite and at other locations in a train-the-trainer fashion. In 2011, 146 citizens were trained to educate about and create biochar in Hampton Roads. The citizens gained awareness as well as tools to engage them in carbon sequester and soil and water remediation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
132	Weather and Climate
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
605	Natural Resource and Environmental Economics

Outcome #21

1. Outcome Measures

Appalachian Regional Initiative for Environmental Science

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Appalachian coal mining industry faces vigorous public and regulatory challenges, particularly in the areas of potential water quality and human health impacts and ""environmental justice"". While the coal industry has supported numerous internal and local research program to address these concerns, their results are often kept proprietary or viewed as being ""biased"" by their opponents and federal regulators (USEPA and FIW). One issue in particular, emission of total dissolved solids (TDS) and its impacts on headwater stream biota, threatens to drastically limit or eliminate coal mining from the region.

What has been done

Working with a team of scientist from the Virginia Center for Coal & Energy Research (VCCER) and the Mining Engineering Dept. (MINE), I played a leading role in the development of a far-reaching research proposal that addresses the majority of current-day issues and concerns with active surface coal mining in the Appalachian region. To date, over \$15 million has been committed to the study over the next five years by the coal industry. Parallel study funding has been obtained from other agencies and sources such as Powell River Project. We have established and funded major cooperative research programs with WVU and UK and smaller studies with a number of other universities (e.g. OSU, Marshall, Pitt and PSU).

Results

This is the largest study of its type ever funded. Short-term results are expected in mid- to late-2012 and will begin to provide an unbiased assessment of what the actual affects of coal mining are on the environment and human health along with development of appropriate control technologies and best management practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
403	Waste Disposal, Recycling, and Reuse
610	Domestic Policy Analysis

Outcome #22

1. Outcome Measures

A Systems Biology Approach to Cellular Regulation of Seed Filling

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Plants as "green factories" offer a solution to growing food and energy needs. From an agronomic perspective, seeds are the lowest cost/highest volume biological producers of protein and oils, which are valuable sources of food and chemicals. Approximately 19B lbs of vegetable oil are currently produced annually in the U.S., which represents 70% of total fats and oil produced. In 2007, over 3.4 billion lbs of vegetable oil were converted into 450M gall. of biodiesel, worth about \$1.5B. The production of biodiesel in 2007 was 225 times higher than in 2000. To obtain high oil content in seeds, rational metabolic engineering strategies are needed based on the knowledge of the corresponding regulatory mechanisms. Systems biology approaches such as metabolic flux analysis (MFA) allow better understanding of metabolic regulation by globally investigating cellular interactions in seed composition. At VT, this research falls within 3 key College of Agriculture and Life Sciences initiatives: Agricultural and Environmental Sustainability, Biodesign and Bioprocessing, and the Green Industry.

What has been done

In 2011, Collakova's "Seed Metabolic Regulation" lab was producing preliminary data for funding at the Department of Plant Pathology, Physiology, and Weed Science (PPWS) at VT. The goal was to use this funding for basic research regarding the regulation of the oil and protein formation in Arabidopsis and legume seeds, such that the resulting knowledge will be used in engineering oil-based products in soybean and peanuts. To elucidate regulatory mechanism underlying seed filling, we initially focused on metabolomics aspects to identify major metabolic regulators. A number of grant proposals were submitted to NSF, DOE, and locally to enable this project. Start-up funds and NSF-MCB-1052145 funds (\$880,000) were used for preliminary work

in Arabidopsis, while internal Bioprocess and Bioengineering seed funds (\$155,361) were used for the sub-projects relevant to soybean work.

Results

Arabidopsis seeds accumulate up to 40% of each oil and protein in their seeds, while soybean seeds contain 20% of oil and 40% protein. Building blocks (metabolites such as fatty and amino acids) of oil and protein can be made by different metabolic pathways and we can determine how these metabolites are formed by assessing changes in metabolite levels and quantifying flow of carbon in metabolic network in developing seeds. We tested several USDA soybean lines that accumulate different levels of oil in their seeds (from 6 to 25%) for their ability to retain altered seed composition in cultures hoping to identify lines with the relevant genetic determinants affecting the seed directly. The reason was to identify and study major seed factors regulating seed composition in legumes. The results showed that all these lines have altered seed composition not because of the seed itself, but probably because of the effects caused by the mother plant (e.g., differences in maternally provided nutrients will cause changes in seed composition), but this remains to be confirmed. The new NSF project involving exploration of regulation of Arabidopsis thaliana seed metabolism was launched in spring 2011. We are taking advantage of combining experimental and computational approaches to identify regulators of seed metabolism. We are screening about 200 Arabidopsis seed transcription factor mutants potentially affected in seed composition. The genotyping is done and ongoing phenotypic screens have identified 3 mutants with significantly altered seed protein levels that will be further investigated. The computational approach has yielded a preliminary gene-interaction network, from which we can identify potential regulators of seed metabolism and composition.

4. Associated Knowledge Areas

KA Code	Knowledge Area
206	Basic Plant Biology

Outcome #23

1. Outcome Measures

Balancing bioenergy benefits with the risk of invasiveness

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The nascent bioenergy industry is growing at a tremendous pace as they identify new crops, improve existing crops, and target specific growing regions. Virginia will play an important role in this industry as we adopt new crops to replace the dwindling tobacco fields. However, as the industry develops there is a growing concern that the crops we use could escape the cultivated environment and become harmful invasive species. One component of my research program is to evaluate the threat posed by a multitude of crops throughout the Southeast, and identify mitigating strategies to reduce the threat. The concern over the invasive potential of bioenergy crops has been expressed by state and federal officials, environmental organizations, academics, and the bioenergy industry. Thus, my research program aims to present an unbiased evaluation of the invasion risk. We are conducting field, greenhouse, laboratory, and modeling studies to meet our goals. Results are being disseminated via peer-reviewed publications, presentations, and extension documents.

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
206	Basic Plant Biology
610	Domestic Policy Analysis

Outcome #24

1. Outcome Measures

Biomass Energy Fuel Characterization and Pilot Stack Emission Testing Program

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Bioenergy project development in Virginia includes large scale biorefineries, to combined heat and power projects, to smaller scale facilities located on farms or small businesses. As with most new technologies, these projects often face significant hurdles to their development and successful implementation. Unfortunately, these hurdles can prevent good projects from happening as the developers lack the capital to invest in fully exploring the feasibility of a project let alone its development. Regrettably, this is too often the case with smaller projects which lack grant, corporate, or government support to assist in weathering the costs of project feasibility work, and many good fuel-switching opportunities go unexplored, and undeveloped. The collective effect leaves Virginia farmers and small businesses at a disadvantage to others that have successfully switched to less costly, and less volatile, renewable sources of energy. A common hurdle to project development is costly emission testing data.

What has been done

In collaboration with students, faculty, and agency personnel from Virginia Military Institute, Virginia Tech Department of Civil Engineering, Virginia Tech Department of Biological Systems Engineering, Virginia Cooperative Extension, Virginia Department of Environmental Quality, and the Virginia Department of Mines, Minerals and Energy, a pilot program was launched to assist Virginians interested in utilizing bioenergy with initial stack emission testing. This pilot program was designed for smaller projects that could not pay the initial cost of third party emission testing as a component to assessing the overall feasibility of the project. The pilot program also assisted with fuel characterization. Fuel characterization was performed to meet state regulations and emission testing assessed criteria pollutants, including: particulate matter, carbon monoxide, nitrogen oxides, and sulfur dioxide.

Results

The pilot program provided preliminary stack emission data for three manure to energy projects. The conversion technologies included combustion of biogas from anaerobic digestion, combustion of syngas from gasification, and conventional thermochemical combustion of biomass. In addition to the field campaigns associated with collecting the stack emission data, the pilot project also conducted a proximate, ultimate and nutrient analysis (when appropriate) for eight sources of biomass under consideration as feedstocks for bioenergy projects. The biomass samples included: switchgrass, chipped hardwood slash, separated dairy solids, and various poultry litter samples.

One result was the timely delivery of stack data for a variety of manure to energy conversion technologies as the Commonwealth of Virginia, farms, project developers, and NGOs ponder practical solutions to implementing the Commonwealth's Watershed Implementation Plan (WIP) in response to the Chesapeake Bay TMDL. A key component to this plan is, within the next five years, to export 75,000 tons of poultry litter from the central Shenandoah Valley out of the region. One technological solution is to use a variety of thermochemical conversion technologies to recover energy and concentrate phosphorous within an ash-like product. However, air emissions associated with many of these technologies are to date relatively unknown. 2011 bore witness to significant poultry litter to energy project development of all scales within the Chesapeake Bay Watershed. The emissions and fuel characterization data provided via this pilot project provided timely information to project developers and project financiers in evaluating the merits, and limitations, of proposed technological solutions and on-site energy generation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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Outcome #25

1. Outcome Measures

In vitro dynthetic three-enzyme complex facilitated metabolite channeling

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In vitro biosystems have been used as fundamental research tools for understanding living systems for more than one hundred years because of its open access and ease control. In vitro synthetic biology, however, is suggested to be a new biomanufacturing platform due to several advantages in industrial applications (Swartz 2011; Zhang 2011a). First, it can implement some biological reactions that living microbes or chemical catalysts cannot implement before. For example, beta-1,4-glucosidic bond linked cellulose can be efficiently converted to alpha-1,4-glucosidic bond linked starch by a mixture of intracellular and extracellular enzymes (Cheng et al. 2012). Second, very high product yields are usually accomplished without the formation of by-products or the synthesis of cell mass. For example, 12 H₂ was produced per glucose unit of cellulosic materials and water, three times of the theoretical yield of anaerobic hydrogen-producing fermentation. Third, enzymatic systems without the barrier of cellular membrane usually have faster reaction rates than microbial systems. Forth, enzyme cocktails enable to tolerate toxic compounds better than microorganisms. Fifth, enzymes usually work at broad reaction conditions, such as high temperature, low pH, the presence of organic solvents or ionic liquids (Panke et al. 2004).

What has been done

Despite the above appealing advantages, in vitro synthetic biology often requires intensive efforts in the preparation of numerous enzymes as building blocks, especially when stable enzymes are not commercially available. The construction of synthetic modules containing several enzyme parts is appealing because it not only significantly decreases the assembly labor by preparing

numerous enzyme parts but also may increase reaction rates among cascade enzyme complexes through substrate channeling phenomena and avoid the degradation of labile metabolites (Dueber et al. 2009; Zhang 2011b). Such synthetic enzyme complexes could be regarded as biocatalytic modules.

Results

In our study, we assembled three different type of dokerin-containing enzymes into a synthetic enzyme complex. When the cell extracts of four cell cultures were then mixed together in the presence of low-cost insoluble cellulosic material, the synthetic three-enzyme complex was purified through one-step adsorption on low-cost and biodegradable cellulosic material. The substrate channeling effects among this enzyme complex was investigated.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment

Outcome #26

1. Outcome Measures

Waste Solutions Forum

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Dairy Science professor Dr. Katharine Knowlton initiated a multidisciplinary stakeholder organization (the ?Waste Solutions Forum?) to identify and implement comprehensive and innovative solutions to managing excess animal manure and poultry litter. Partner organizations have obtained more than \$10 million in funding for research, outreach, and pilot projects since 2005. Partners include agricultural groups, conservation organizations, 5 state agencies, local government, and faculty from CALS and COE. Projects focus on bioenergy, nutrient management, water quality and farm profitability.

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
402	Engineering Systems and Equipment
610	Domestic Policy Analysis

Outcome #27

1. Outcome Measures

Enhancing on-farm biogas production from dairy manure

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Biogas is a renewable source of energy that can be used for heating purposes, as a fuel, and generating electrical power. It contributes to the improvement of the environment (especially, mitigation of greenhouse gases) if produced in engineered systems. On-farm biogas production also generates an alternative source of income to farmers. One challenge to implementing anaerobic digesters on dairy farms is producing enough gas from manure to make the process cost effective. This challenge can be addressed by optimizing the digester operation parameters including choosing the appropriate retention times and selection of feedstock to co-digest with dairy manure. A dairy farm in Virginia installed a two stage mixed flow reactor system to produce biogas from manure. The farm wanted to evaluate ways of improving the quantity and quality of biogas they could produce from the digester which was designed to operate at a typical retention time of 25 to 30 days for manure with 10 to 15% total solids.

What has been done

Experiments were conducted in the lab to determine the fermentation potential of dairy manure and an industrial food waste product as a feedstock to co-digest with dairy manure. The

fermentation potential test was chosen to enable us determine the ability of the dairy manure and other feedstock to produce the necessary volatile fatty acids required by microorganisms to make methane. Batch fermentation tests were conducted in the lab at a temperature of 38 degrees Celsius to determine the amount of volatile fatty acids produced after 1, 2, 3, 4, 5, 7, and 9 days. Also, rigorous monitoring scheme involving sample collection from the influent, inside, and effluent of the digester and the quality and quantity of gas produced was performed.

Results

The emerging results from the fermentation potential show that the maximum VFA is produced after 4 days of fermentation. So, to utilize the full potential of dairy manure as feedstock for biogas production, the inflow into the digester should be adjusted to allow for a 4 day retention time in the acid chamber of the on farm digester. Co-digestion with an industrial food processing waste also showed a maximum VFA production in day 4 and that augmenting dairy manure with at least 10% of this product increased VFA production ten times more than just manure alone. Augmenting dairy manure with this product increased the volume of gas produced but decreased the quality of biogas production by producing 5% more carbon dioxide compared to the gas quality produced by dairy manure only.

4. Associated Knowledge Areas

KA Code	Knowledge Area
403	Waste Disposal, Recycling, and Reuse

Outcome #28

1. Outcome Measures

Program for identifying new biofuels and their synthetic routes

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Biofuels are of considerable research interest, and alternatives to ethanol are being sought. Synthetic biology is enabling the production of new chemicals through biology, and better biofuels are being sought. The ideal biofuel should (i) release significant energy when burned, (ii) be

biodegradable, (iii) minimize health risks upon exposure, and (iv) result in clean combustion products.

What has been done

A collaboration at Virginia Tech has been formed between Ryan Senger and David Bevan to derive environmentally responsible biofuels. The Senger research group has developed an algorithm to design new metabolic pathways that yield products non-native to bacteria. These products are then screened to detect new molecules with superior biofuel properties. The Bevan research group then analyzes these pathways in detail and suggests enzyme engineering strategies to ensure high production of the new potential biofuel.

Results

The collaboration has received seed funding from the Institute for Critical Technologies and Applied Science (ICTAS) at Virginia Tech. The algorithm to build synthetic metabolic pathways and identify new potential biofuels has been completed, and several new biofuel candidates have been identified. The analysis by the Bevan research group will follow in the near future, as will the physical production of successful candidates.

4. Associated Knowledge Areas

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

Outcome #29

1. Outcome Measures

Identification of metabolic engineering targets for biofuels production

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Several research groups are working on the conversion of plant materials (lignocellulose) to fermentable sugars and eventually biofuels. This process is currently inefficient, and several researchers are engineering cellulase enzymes to be more efficient. However, many other aspects of the process need to be engineered and there was no efficient method for assigning priority.

What has been done

Results

Through the use of agent-based modeling and global sensitivity analysis, a collaboration between the Senger research group at Virginia Tech and the research group of Steve Fong at Virginia Commonwealth University has derived a comprehensive list of prioritized engineering targets for producing biofuels from cellulose.

4. Associated Knowledge Areas

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

Outcome #30

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Many low-income apartment renters in Arlington frequently struggle with paying their rent and utilities. When they do they often turn to Arlingtonians Meeting Emergency Needs (AMEN), a local nonprofit organization that provides emergency assistance. In 2010 this group approached FCS agent Jennifer Abel saying that they had become concerned over the high electric bills of many of their clients. Many people living in one- and two-bedroom apartments frequently came to them with electric bills over \$100. They feared that the culprit was poor energy efficiency in the apartments and wanted to know if there was anything that Extension could do to help.

What has been done

The FCS agent contacted Arlingtonians for a Clean Environment (ACE) and together VCE, ACE, and AMEN created a program that would involve training a corps of Master Weatherizer volunteers to provide weatherization services and energy efficiency education to low-income renters. They applied for a grant from the Arlington Community Development Fund with ACE as the lead organization. The \$25,000 grant was received in July 2011. The goals of the first year of the project are to train 30 volunteers who will weatherize 150 units. Electric bills from residents are being collected before and six months after the weatherization in order to track changes in energy consumption, with the goal of reducing bills by at least 10%.

Results

In October and December 34 Master Weatherizer volunteers were trained in three classroom and two hands-on sessions. The FCS agent partnered with Arlington Partnership for Affordable Housing (APAH) to select two properties where the initial 150 units will be weatherized. Volunteer teams will begin weatherizing units on January 7, 2012, and will provide education and additional weatherization services throughout the winter. The partner organizations are seeking a second year of funding to continue the program at other properties and plan to make the program sustainable by charging fees to weatherize houses in Arlington and using those fees to pay for supplies to continue weatherizing low-income apartments.

4. Associated Knowledge Areas

KA Code	Knowledge Area
610	Domestic Policy Analysis

Outcome #31

1. Outcome Measures

Utilizing Locally-produced Canola to Manufacture Biodiesel

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Increased utilization of renewable biofuels results in significant microeconomic benefits to both

the urban and rural sectors, and the balance of trade. If farmers adopt use of canola oil for manufacturing of biodiesel at their own farms, the returns from reduction of fuel costs would be tremendous. It is envisaged that each farmer with 2-3 tractors could grow his own canola, invest in a small crusher (at a cost of approximately \$7,000), and reduce his off-farm purchases of fuel. In the case of small farmers, a few of them could join together and produce their own biodiesel for use in their farm machinery.

What has been done

Several field days to demonstrate canola production, crushing of canola seed to obtain oil, and to use this oil as a biodiesel; feedstock exposition has been conducted in Virginia with an estimated audience of 200 agricultural producers.

Results

An extensive audience, consisting of Virginia farmers, has been exposed to production of canola as an alternate crop for use of its oil as a healthy human food and for conversion into biodiesel. In addition, one farmer, in Franklin County, has established canola at his farm to use canola meal as a feed for his dairy cattle. During the field day conducted at this farmer's field, several of his neighboring dairy farmers showed considerable interest in producing canola for utilization of canola meal. Efforts are underway to market the oil for human consumption and/or for use as biodiesel feedstock.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Competing Programmatic Challenges

Brief Explanation

Volatile energy prices and the prospect of new carbon policies have heightened awareness of the importance of sustainable energy systems. The recent economic downturn has forced many producers into survival mode. Some producers are more interested than ever to explore energy efficient production systems to control cost and improve their competitiveness, however, financing some of these equipment upgrades and improvements can be a challenge. Additionally, the Sustainable Energy program is still a fairly new planned program. However, invariably many aspects of energy research and extension are interwoven within long-established extension heritage programing. Future efforts will explore pragmatic ways to most efficiently differentiate among programatic areas with respect to the inherent and innate components of energy-related issues within multiple extension thematic areas.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

No evaluation studies reported.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 16

1. Name of the Planned Program

Youth Development

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: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	83.4	3.0	0.0	0.0
Actual Paid Professional	95.5	1.5	0.0	0.0
Actual Volunteer	15833.0	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
987172	223043	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
3272434	224143	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
8284117	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Activities include 4-H camping programs (overnight and day), 4-H after-school programs, 4-H inschool 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, and specialized

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 trainings and workshops to educate volunteers.

2. Brief description of the target audience

Youth between the ages of 5 -19, parents, grandparents, community organizations, community partners, community leaders and government officials, donors, K-12 educators, and volunteers.

3. How was eXtension used?

VCE faculty serve on communities of practice, are "Ask-an-Expert" experts. One 4-H Specialist co-leads the Youth for Life Community of Practice.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	145238	272815	644510	476498

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	3	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2011	2488

Output #2

Output Measure

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

Year	Actual
2011	1025

Output #3

Output Measure

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

Year	Actual
2011	178269

Output #4

Output Measure

- Number of youth engaged in leadership development education.

Year	Actual
2011	32370

Output #5

Output Measure

- Number of clubs where youth are involved in structured after school programming.
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	4-H Camping - Increase the number of 4-H youth, or parents of youth that report a positive change in responsibility and social development as a result of participation in a 4-H camp.
2	4-H Citizenship - Increase the number of 4-H youth participating as volunteers and through community service that demonstrate teamwork skills and community commitment.
3	4-H Animal Science - Increase the number of 4-H youth and adults participating in animal science programming that demonstrate increased knowledge of raising animals in a responsible, ethical, and economically viable manner.
4	4-H Communication and Expressive Arts - Increase the number of 4-H youth participating in communication and expressive arts programming that demonstrate increased self-efficacy in public speaking, presentations, visual arts, and performing arts.
5	4-H Foods, Nutrition and Health - Increase the number of 4-H youth participating in foods, nutrition, and health programs that demonstrate healthy living choices.
6	4-H Natural Resources and Environmental Education - Increase the number of 4-H youth participating in natural resources and environmental education programs that demonstrate environmentally responsible behavior.
7	4-H Plants, Soils and Entomology - Increase the number of 4-H youth participating in plant, soils, and entomology programming that learn the interconnectedness of organisms and their environment.
8	4-H Science, Engineering and Technology - Increase the number of 4-H youth that demonstrate sustained learning in science and technology programming.
9	4-H Careers and Consumer Education - Increase the number of 4-H youth that increase their awareness of potential career pathways through service learning programs and/or through the 4-H college fair.
10	4-H Careers and Consumer Education - Increase the number of 4-H youth that indicate increased knowledge/skills related to economic education and/or entrepreneurship.
11	4-H Leadership and Personal Development - Increase the number of 4-H youth that demonstrate leadership knowledge by participating in a leadership position on the club, county, state, or national level.
12	4-H Character Counts! - Increase the number of 4-H youth or parents of youth that indicate a positive change in behavior as a result of participating in 4-H Character Counts! programming.
13	4-H Adult Leaders - Increase the percent of adult 4-H volunteers participating in leadership and volunteer development trainings that indicate increased knowledge and skills in implementing 4-H programming as a result of participation.

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Participation in 4-H activities is positively related to youth life skill development. Building communication skills, teamwork skills, and a sense of responsibility in youth are just a few of the ways that Virginia Cooperative Extension programs influence young people on their way to adulthood. Life skill development in youth is important because it helps ensure that youth will grow up to become positive, contributing members of society both at home and in the workplace. The Virginia 4-H camping program allows youth to make new friends and become more independent in their time away from home.

What has been done

4-H camping benefits youth by providing an educational, recreational, and social experience in an outdoor setting away from home. More than 30,000 youth ages 5 to 18 participate in Virginia 4-H camping each year.

Results

Post camp surveys indicate that campers ages 9-13 report increasing their independence as a result of attending 4-H camp. 91% of youth attending 4-H campers reported increases in independence skills.

Asked what they enjoyed the most about 4-H camp, campers responded: "It's fun to be with friends and have a time away from family?", "It is a great way to meet new people/staff?", "It's really fun and I had a great year and to see my BFF?" and 4-H being "awesome?" was a reoccurring comment.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

For young people who choose to be part of a 4-H Club, research shows youth are more likely to be ?educationally motivated, have higher self-esteem and communicate more maturely than their peers. (Cornell University, 2008). They need to gain these skills, increase knowledge, and change their behavior, and/or aspire to accomplish certain goals in environments that are safe psychologically and socially.

What has been done

4-H agents with the aid of trained volunteers, manage viable 4-H club programs to assist youth to become more involved in their communities. Studies show that youth who participate in 4-H clubs do better in school, are motivated to help others, develop leadership life skills, public speaking, increase self-esteem, accept greater responsibility, increase communication and planning skills, and make lasting friendships (Cornell University & Rutgers University, 2008).

Results

Seventy six youth participated in the Surry County 4-H Club program in four clubs. Youth participated in community and project clubs. The following percentage of youth report increases in leadership skills- 82%, specific subject matter knowledge gains-95%, parliamentary procedure skills - 89%, teamwork skills - 72%.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Hanover County agriculture provides over \$44 million in cash revenue with over 33% of the land in production. This includes over 10,000 head of cattle, mostly cow/calf operations but also a dairy with national award winning cows. In addition the county produces over 700,000 broilers.

What has been done

As FFA in this county does not focus on animal science, 4-H provides the programming for youth and parents interested in raising, showing and selling livestock. The 4-H Livestock program provides numerous opportunities for these youth to hone their skills with project animals along with broader life skills. Club was supported by informing them of opportunities, training for leaders, collateral materials, learning kits, and recognition.

Results

In one county in 2011 there was a 36% increase in the number of youth who participated in the livestock program, an increase over 2010.

All youth in the livestock club reported they increased their knowledge of raising animals in a responsible, ethical and economically viable manner.

Ninety percent (90%) of parents/volunteers reported an increase in youth self confidence/poise and responsible behavior.

4. Associated Knowledge Areas

KA Code **Knowledge Area**
806 Youth Development

Outcome #4

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

To be successful in today's fast paced world and in all facets of life, effective communication is essential. Effective communication skills are comprised of several components including writing, speech, listening, and non-verbal cues. Well-developed and practiced communication skills are as important as technical and intellectual qualifications for youth in their pursuit of careers.

What has been done

Public Speaking club contests cumulating in a county contest for grades 4-7 were held in one county during November and December to give youth a chance to practice their public speaking and communication skills.

Results

A total of 608 youth participated in club public speaking contests.

?99% (607) of participants reported an improvement in their confidence level in general.

?86% (522) of participants reported a significant improvement in their confidence level with public speaking.

?90% (547) of participants reported that they would be willing to do Public Speaking again.

A total of 70 youth participated in the county public speaking contest. Of which, 50, who were surveyed, reported:

?100% (50) of participants reported an improvement in their confidence level in general.

?96% (48) of participants reported a significant improvement in their confidence level with public speaking.

98% (49) of participants reported that they would be willing to do Public Speaking again.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #5

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Chronic diseases are the leading cause of morbidity and mortality in the United States. A sedentary lifestyle and poor diet are linked to being overweight and obese. Unhealthy lifestyles and poor diets can also lead to an early onset of chronic diseases. Heart disease, stroke, cancer, and diabetes are the most prevalent, but respond best to sustainable health behavior changes. The Centers for Disease Control and Prevention reports, of the deaths occurring in Virginia during 2005, 25% were linked to heart disease and 24% were associated with cancer. A reported 1,642 Virginians died from diabetes in 2005. In 2007, 62% of Virginians were overweight or obese and 74% consumed less than 5 fruits and vegetables each day (Centers for Disease Control and Prevention, 2008). Chronic diseases result from unhealthy lifestyles and are a financial burden to the state and federal government. The estimated yearly medical cost associated with obesity is \$147 billion. Likewise, an obese person has medical costs that are \$1,429 more than his or her normal weight counterpart (Centers for Disease Control and Prevention, 2010).

What has been done

Virginia Cooperative Extension's (VCE) Expanded Food and Nutrition Education Program (EFNEP) enrolled seven hundred eighty-six (786) youth participants whose income level was up to 185% of federal poverty guidelines. Participants learned to select, buy, prepare, and store foods to meet the nutritional needs of their families, while operating within a sound budget, and developing organizational skills.

Results

Youth participating in EFNEP:

?81% increased their consumption of vegetables.

?82% increased their consumption of whole grains.

?86% increased their consumption of nutrient dense snacks

?74% decreased their consumption of soft drinks

?86% increased their physical activity level.

One hundred eighty-eight (188) volunteers contributed over one thousand one hundred twenty-eight (1128) hours to EFNEP during this reporting year enhancing program delivery.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #6

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Participation in environmental education, outdoor living skills or ecology classes helps improve awareness of and appreciation for the natural world. Youth in Virginia and the country are facing higher rates of obesity, diabetes and other health issues as well as a decline in physical activity. Researchers have cited a variety of causes of rising rates of poor health including longer amounts of ?wired? time and less time spent out-of-doors in organized activities and free play. A national ?no child left inside? movement focuses awareness on the importance of youth spending time outdoors.

What has been done

Virginia 4-H Camps expose youth to a prolonged outdoor experience that includes significant levels of physical activity in an environment free of electronic distractions. Camp classes teaching concepts related to natural science and environmental studies are enhanced by the natural setting in which campers are living and working. In 2011, 202 campers and CIT's plus forty-six teen leaders from the counties of Buckingham, Charlotte and Prince Edward participated in a five day residential Junior 4-H Camp at Holiday Lake 4-H Center.

Results

Post camp surveys indicate that campers ages 9-13 report increasing their affinity for nature as a result of attending 4-H camp. Seventy percent of youth attending 4-H camp definitively indicated an increased appreciation for nature as a result of their camp experience. Ninety-two percent reported enjoying the outdoors while 77% enjoyed the freedom of being outside and 67% felt with certainty that they connected to the natural environment. This increased connection to the natural world improves youth chances of increasing physical activity outdoors and decreasing risky behaviors.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #7

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The city of Chesapeake enacted a new tree canopy ordinance and the city's school grounds were deficient in trees due to poor tree selection and lack of grounds crew maintenance staff. Also through questioning the Chesapeake Elementary School Science Coordinator we determined that

1st graders needed additional help with tree Standard of Learning test questions.

What has been done

A program was developed that would teach students about tree parts, the utility and importance of trees for humans as well as their role in the ecosystem. The program was designed to be an interactive discussion session stimulating the kids to think about their life interactions with trees. Then they went over how to correctly plant and care for a tree. They selected trees based on their lower maintenance, uniqueness and ability to match multiple SOL subjects. They also showed the kids how they could make bark protectors out of recycled 2-liter plastic bottles. Lastly they created a poster with leaves covering 10 activities/observations that each class would weekly perform and hence check their tree for water and/or problems. This then would help the school grounds maintenance staff ensure the success and life of the trees. They coordinated the tree planting sites with the School Grounds Maintenance Supervisor and the Chesapeake Science Coordinator to the schools.

Results

Results: We taught students in 107 classrooms (about 2425 children and 150 teachers) and plant 92 trees! From the

classroom responses we received many thankyou's from the teachers, cards from the children and compliments by principals and other city officials who heard about the program. We will be following up in 2 months with a

evaluation to all the teachers to help us improve this program and get a head start on it for next year. So far 90%

of the trees from 2008-2010 are thriving and the kids are still checking on their trees as well. Also because of this program I have been asked to design plantings at Deep Creek Central and Deep Creek Elementary schools this year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #8

1. Outcome Measures

4-H Science, Engineering and Technology - Increase the number of 4-H youth that demonstrate sustained learning in science and technology programming.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Although Virginia's NAEP average scale scores in math and science tend to be above the national public school average, expanded opportunities to scaffold and anchor science concepts, especially at the elementary and middle school levels, are needed. Virginia 4-H is uniquely positioned to provide youth connections to passionate, professional mentors and provide opportunities for sustained practice of science skills while increasing knowledge, interest, and aspirations. 4-H has focused on the goal of providing Virginia Youth with a background in science, engineering, technology, and math.

What has been done

Working with elementary school teachers, professional collaborators, and volunteers, Virginia 4-H has provided STEM programming to approximately 33,000 youth through school enrichment, camping, and 4-H Clubs. Consistent emphasis has been placed on content knowledge, skills, aspirations, and attitudes.

Results

Although statewide measures are not in place, representative samples have shown the following: Junior 4-H Wildlife Explore completed 32 hours of educational programming. Post-camp survey results found that after camp participants reported an increase in knowledge in the following areas: water quality through insect identification (16% before and 75% after); use of a dichotomous key (25% before and 84% after); paper making (46% before and 91% after). Participants also were able to correctly identify the following science-related term and definition: watershed (50%); point-source pollution (33%); non-point source pollution (42%). Junior 4-H Scientist Explorer camp members had 34 hours of educational science activities. Post-camp surveys found an increase of knowledge in the following areas: alternative energy production (36% before and 88% after); use of the engineering design process (16% before and 72% after); DNA extraction from a strawberry (20% before and 80% after). Approximately 45% of participants were able to correctly identify the steps of the engineering design process. The LEGO Robotics Day camp participants completed approximately 20 hours of educational programming. At the completion, campers reported an increase in knowledge in the following areas: basic parts of a robot (86%); programming skills (74%); and using a sensor to program a robot (74%). Participants were also able to correctly match the following science related term with its definition: x-axis (52%); y-axis (48%); decibel (70%); and loop (67%).

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #9

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Teachers indicated a need for hands-on integrated learning in the academic enrichment block of time that would provide citizenship lessons while teaching core-content at the same time. In one county, a thematic unit centered around service-learning was developed that combined natural resources education with civics.

What has been done

Fifty-eight sixth grade students participated in a series of six lessons that focused on the core content of renewable resources. Students learned about the Virginia forestry industry and then collected paper from the classroom and copy room that was destined for the trash can. Utilizing Project Learning Tree curriculum, the paper was recycled into cardstock. During the paper-recycling phase, students were asked to find a soldier that was serving, or had served in the armed forces or reserves to send a personalized thank you note for their service. Geography and language arts lessons were also incorporated as students crafted inspiring messages and identified where the cards would be sent.

Results

Connecting students to local soldiers increased the awareness of civic duty and sacrifice as some students shared stories of family members who were currently serving abroad as they worked on the project. 40% of the participants had no personal connection to those serving in the armed forces and rather than choosing to select an "Any soldier" address, 90% of those students chose to send additional cards to family members of classmates who had shared a story of family service. 88% of all youth participants reported an increased awareness of civic responsibility as a result of participation in the project. One student stated, "I know it is not enough, but I hope they like the card I sent."

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #10

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With the economic downturn, the need for financial education has risen in prominence. On March 26, 2005, the Virginia General Assembly approved SB 950 (now Code of Virginia Section 22.1-200.03B) directing the Virginia Board of Education to "establish objectives for economic education and financial literacy." Beginning in the 2011/12 school year, high school students will be required to study financial literacy. The Reality Store and Kids Marketplace simulation programs of Virginia Cooperative Extension specifically relate to Objective 2 of SB 950: "The student will analyze how career choice, education, and skills affect income and goal attainment.

What has been done

In response to the issue, a Reality Store program was implemented, in one urban area, that provided participants with a taste of "reality" through an educational role-playing simulation related to making financial choices. In 2011 two Reality Stores were conducted, reaching 370 students. Students are given a glimpse of their future in a fun/exciting way. They become aware of their need for basic skills in financial planning, goal setting, decision making, and career planning. Participants are also encouraged to evaluate their career options and to pursue higher education. Forty-four volunteers assisted with the Reality Store events. Several area businesses contributed large numbers of volunteers, including the Commonwealth One Credit Union. Three Kids Marketplace events were conducted with 137 students.

Results

Participants completed an evaluation at the end of the Reality Store program.

253 (85%) said that Reality Store gave them an increased awareness of making smart financial decisions.

284 (95%) said that having insurance and a savings account would help them plan for emergencies.

264 (88%) were able to put and keep some money in a savings account.

In a follow-up survey conducted one month after the event, 75% said that the activity gave them more information about making wise financial decisions, 84% said they will manage their monthly expenses by creating and following a spending and savings plan, and 91% said they will get the money they need for their goals and unexpected expenses by making monthly deposits to a savings account.

In an evaluation conducted at the end of the Kids Marketplace program, 91% of students said they learned more about using money, 95% said they learned how to choose what they need with their money, 91% learned that different jobs pay different amounts, and 92% said the activity gave them new ideas about how they will handle their money in the future.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #11

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	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.

What has been done

In response to the research, Henry County-Martinsville 4-H provided leadership training for teens 13 ? 19 years of age through officer training, camp counselor training, Leadership Institute, State 4-H Cabinet, 4-H Teen Board and/or leadership projects to build leadership skills. As a result, 120 teens participated in 60 hours of leadership training over a six month period.

Results

95% of teens reported positive attitude change in responsibility, decision making, conflict management, or problem solving. 70% of teens reported gaining knowledge of the importance of accepting differences of others through Character Counts. Additionally, 97 % of teens indicated improvement in critical thinking and teamwork as a result of participation in leadership training. Furthermore 100% of parents reporting seeing a difference in their children's grades and behavior and 98% of 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.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #12

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Too many youth are not learning or practicing good character. According to the 2008 Report Card on Ethics of American Youth, surveying nearly 30,000 high school youth; stealing, lying, and cheating have climbed to alarming rates. Additionally, violence is often the option used to handle

conflict resolution. Therefore, implementation and delivery of a character education program is critical for fostering youth's overall sense of well-being and positive development. The Character Counts programs were implemented the fall of 2011.

What has been done

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

Results

In 2011, the Virginia Character Counts! program reached 8,511 youth ages 5-19, through after school programs, day and overnight camping, 4-H clubs, and special interest programs. Through these efforts each child received a minimum of six hours of Character Counts! programming. In addition, two statewide Character Counts! Train the Trainer trainings were conducted in which 64 professionals were trained. Evaluation results indicate that out of a scale of 1-5, 1 being little/none and 5 being complete, 92% of participants ranked their understanding of the six pillars as a 4 or higher. Eighty-nine percent ranked their preparedness of implementing Character Counts! as a 4 or higher and 100% of participants ranked the trainers as either informative and effective or very informative and effective. When asked how they thought they would use the information provided in the training, the following comments were specified: share, train, utilize and implement the program with colleagues; develop a comprehensive 4-H/school program that teaches and reinforces these character values; to generate thinking; and in daily interactions with peers and adolescents.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #13

1. Outcome Measures

4-H Adult Leaders - Increase the percent of adult 4-H volunteers participating in leadership and volunteer development trainings that indicate increased knowledge and skills in implementing 4-H programming as a result of participation.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

An active, effective 4-H Club can not run smoothly without the guidance, vision, and knowledge of adult volunteer leaders. In 2011, three new clubs started and existing clubs expanded membership and/or experienced leadership change. Due to the large amount of new club leaders and volunteers, the continuing effort of existing adult volunteers to expand their leadership development is extremely necessary.

What has been done

In the Spring and Fall of 2011, four adult volunteer trainings were held for both new and existing volunteers. Volunteers participated in presentations and activities that covered club management, risk management, history of 4-H, volunteer characteristics, Virginia Cooperative Extension policies, and youth development concepts. A survey was sent to all existing adult volunteers inquiring about what 4-H training topics could be provided by the 4-H Extension Agent.

Results

Adult volunteers left each training with an increased knowledge and understanding of 4-H policy, risk management, club management, and youth development. Of the returned evaluations, on a scale from 1 to 5, with five being the highest rating, the average level of knowledge about understanding basic 4-H policies and procedures before the training was a 1.9. After the training, the average level of knowledge was a 4.3. Of the returned evaluations, the average level of knowledge about guiding principles and essential elements of positive youth development, the average score before the training was a 2.4. After the training, the average score was a 4.8. Overall, 100 percent of new volunteers left the trainings with an increased level of knowledge and preparation to serve as a 4-H adult club leader and advisor. 75 percent of existing volunteers left the trainings with an increased knowledge on youth development concepts.

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

Brief Explanation

External factors that affected outcomes in 2011 include:

- Natural Disasters - Virginia had a devastating hurricane, earthquake, and a series of tonadoes that impacted programming across the state, primarily because of school closings and delays.
- Economy - As a reflection of the national economic downturn, Virginia families lost

jobs, homes, were displaced and emotionally affected.

- Appropriations Changes - There was an initial severe reduction in appropriations to Extension.

This was later overturned and appropriations were increased to above previous levels. These changes in appropriations caused initial hiring freezes. When the appropriations were restored it resulted in a training challenge with so many newly hired agents.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}