2009 Virginia Polytechnic Inst. & State University and Virginia State University Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 06/08/2010

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), 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.

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.

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 planning and 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 2012, 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, with expected completion around July 2010. The process is expected to systemically examine Extension's core values and mission; define community issues, trends, opportunities, and challenges; identify partners who are currently charged with addressing each issue; and delineate the role VCE should play in achieving desired goals.

VAES, VSUARS, and VCE GOALS: This year's goal areas included: 1) agricultural and environmental sustainability, 2) food, nutrition, and health, 3) biodesign and bioprocessing, 4) the green industry, 5) infectious diseases, and 6) community viability. The VSUARS in particular provides knowledge and technology to small-scale and limited-resource farmers and rural communities to enable them to produce abundant and safe food, while enhancing their economic well-being and quality of life. The primary research goal overall for Virginia is to develop relevant basic and applied research data to form the basis for Extension programming. A wide range of long and short term research projects are undertaken to provide a continuous flow of new or more fully developed knowledge to provide science-based information to enhance the quality of life for citizens. 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.

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

research and Extension faculty are required to submit an annual report through eFARS. This locally developed system documents teaching, research, and Extension accomplishments and impacts for individual, unit, college, and organizational review. Updates to eFARS and contact reporting in 2009 continue to better align planning and reporting with the 15 planned programs presented in this report.

In response to NIFA and external merit reviews of the 2008 report and the 2010-2014 plan of work for Virginia, the number and type of outcomes for some planned program have been modified. These modifications also incorporate the five NIFA focus areas within the structural data framework of the 2009 e-FARS reporting system.

PLANNED PROGRAMS: 1) Agricultural and Food Biosecurity, 2) Agricultural Systems, 3) Animals and Animal Products, 4) Biotechnology and Genomics, 5) Economics and Commerce, 6) Families, Youth, and Communities, 7) Food, Nutrition, and Health, 8) Natural Resources and Environment, 9) Pest Management, 10) Plants and Plant Products, 11) Climate Change, 12) Childhood Obesity, 13) Food Safety, 14) Global Food Security and Hunger, 15) Sustainable Energy.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	350.5	11.8	147.4	13.5
Actual	335.6	17.3	204.0	11.5

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

For the second year in a row, a merit review was conducted with Tennessee and Maryland. Planning and reporting experts reacted to the Virginia planning and reporting efforts. The review recognized areas of excellence, and areas for improvement. Suggestions were incorporated into this year's planning and reporting. Additional merit review efforts are listed below.

Review Process for Research

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 to assure the experimental 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 expertise to serve as a departmental reviewer. The project leader then submits the proposal to his/her department/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 departmentally approved project proposal to the chair of the project review committee for that college with the following items transmitted to the chair electronically: 1.) Four copies of the proposal (if not transmitted electronically), 2.) Four copies of the project leader's vita [2-page maximum] (if not transmitted electronically), 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 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 convenes the committee, the project leader, and the department head to review the proposal. The chair forwards reviewers' comments to the project leader and department head prior to the oral review. 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, who serves as chair. The chair forwards the proposal to the review committee and the subject-matter department head, who is invited to attend the oral review.

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 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 committee to resolve concerns.

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 Program Teams (PT) develop Extension programs. The PTs 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://intra.ext.vt.edu/support/process/documents/2010VCEProgCycleTasksandActionSteps.pdf

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 fourteen PTs and State Program Leaders who serve as partners for each PT. A web-based planning and reporting system organized around the nine 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 are communicated throughout VCE and educational program plans are developed by interdisciplinary PTs composed of 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 PTs. The program proposals are reviewed by VCE programming leadership.

Program proposals from PTs 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, including the amount of time they plan to devote to the program. 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
- Other (focus groups, listening sessions, issue forums, key informant interviews)

Brief explanation.

Virginia Cooperative Extension works with stakeholders to receive input though local Extension Leadership Councils and many other citizen groups at local and regional levels. The citizen groups reflect the 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 107 Extension units in Virginia have an organized local ELC and all Agriculture Research and Extension Centers (ARECs) have active advisory councils. At the state level, VCE works with stakeholders through the state Leadership Council (VCELC). The group includes volunteers representing 22 planning districts in Virginia, at-large members appointed by the director of VCE, leaders representing Virginia's diverse population, businesses, agencies, organizations, VCE District Directors, 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. The Agricultural

Advisory Committee informs teaching, research, and Extension programs within the School of Agriculture. 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 2009, Extension underwent a statewide strategic planning process, designed to 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. Over 1,200 individuals participated in the process, which will result in a long-range plan that produces measurable impacts utilizing a program evaluation process that justifies human and financial resource allocations.

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 underwent a strategic planning process involving over 1,200 traditional and nontraditional stakeholder groups. A committee of 25 identified state agencies, nonprofit and corporate citizens to be 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.

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.
During 2009, 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.

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 Extension's plan of work.

Brief Explanation of what you learned from your Stakeholders

A team of Extension facilitators, site coordinators, and recorders along with researchers led by Dr. Donna Moore recorded the 12,000 comments from the 48 listening sessions. Once the comments were recorded, Dr. Moore worked with each of the session facilitators and site coordinators to review the transcripts and identify any gaps or potential errors in the transcripts. All recorded comments were linked by key words, then printed and published for review by the Steering Committee.

The Steering Committee was charged with reviewing each of the 12,000 comments during a three-day planning session led by Dr. Howard Ladewig in February 2010. Steering committee members were grouped in the four original teams that had developed and managed plans for gathering feedback from 1) internal agents and staff; 2) internal campus and center faculty and staff; 3) external state-level stakeholders; and 4) external local stakeholders.

Common Themes

Each team spent hours reading the comments, identifying common themes, and linking other dialogue statements to each theme. As the teams brought their findings to the full group, it was interesting to watch how

different groups reported similar themes identified by the various internal and external stakeholder audiences.

By the end of the planning session, six focus areas had emerged, and writing teams were assigned. As work begins on drafting and reviewing the text for the strategic plan, teams will seek to expand participation for their groups to include stakeholders internal and external to Extension. You are encouraged to engage in this effort that is so critical for Extension. The writing teams will address each of the following focus areas:

- Value-enhanced agriculture
  - Tony Wolfe, Dee Whittier, Brad Jarvis, Cyndi Marston

- Sustainable natural resources and environment
  - Bob Smith, Michelle Prysby
- Healthy living for youth (obesity)
  - Cathy Sutphin, Glenda Snyder

- Building capacity for communities. (resiliency)
  - Brian Calhoun, Martha Walker, Jewel Hairston

- Healthy families and communities
  - Karen Gehrt, Mary McFerren

- Organizational excellence
  - Lonnie Johnson, Ray Ali, Roger Ellmore, Christine Kastan, Scott Pleasant, Kerstin Roan

These six focus areas align with the college's key initiatives: 1) agricultural and environmental sustainability; 2) food, nutrition, and health; 3) biodesign and bioprocessing; 4) the Green industry; 5) Infectious diseases; and 6) community viability. In addition, the Steering Committee also found the six Extension focus areas to support USDA-NIFA priorities 1) global food security and hunger; 2) climate change; 3) sustainable energy; 4) childhood obesity; and 5) food safety.Additional coordination is required with the central themes of the College of Natural Resources at Virginia Tech, the Virginia-Maryland Regional College of Veterinary Medicine, and the goals of the School of Agriculture at Virginia State University.

Contained within each focus area are multiple overarching issues (e.g., obesity) identified during the internal and external sessions that require collaboration between the writing teams to develop cross-disciplinary goals and objectives. In addition, the organizational excellence team will develop plans for community impact reporting and the accountability process when working in cross-disciplinary programming.

Each team will create program goals and objectives that are unique to Extension and responsive to Virginia's identified issues.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
6894326	2230443	4529537	2499632

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	8492631	1538325	3812359	2499632
Actual Matching	10542067	887169	13137257	2499631
Actual All Other	21198402	592262	37449552	561631
Total Actual Expended	40233100	3017756	54399168	5560894

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

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Agricultural and Food Biosecurity
2	Agricultural Systems
3	Animals and Animal Products
4	Biotechnology and Genomics
5	Economics and Commerce
6	Families, Youth, and Communities
7	Food, Nutrition, and Health
8	Natural Resources and Environment
9	Pest Management
10	Plants and Plant Products
11	Climate Change
12	Childhood Obesity
13	Food Safety
14	Global Food Security and Hunger
15	Sustainable Energy

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Agricultural and Food Biosecurity

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
136	Conservation of Biological Diversity	15%	0%	15%	0%
307	Animal Management Systems	15%	0%	15%	0%
311	Animal Diseases	10%	0%	10%	0%
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	10%	0%	10%	0%
315	Animal Welfare/Well-Being and Protection	10%	0%	10%	0%
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	10%	0%	10%	0%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	15%	0%	15%	0%
903	Communication, Education, and Information Delivery	15%	0%	15%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	4.5	0.6	3.5	0.0
Actual	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The work previously planned in this Planned Program is being reported in other Planned Programs.

2. Brief description of the target audience

The work previously planned in this Planned Program is being reported in other Planned Programs.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	3600	6300	600	1100
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	5	10	
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational meetings, workshops, conferences, and training sessions
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of commercial poultry operations audited for adherence to the Virginia Poultry Federation Biosecurity Guidelines
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Number of newsletters, fact sheets, publications and other print resources
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Number of websites
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Number of research studies conducted
  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	Number of animal premises registered in conjunction with the National Animal Identification System
2	Number of commercial poultry growers adopting biosecurity practices to lower the risk of disease transmission
3	Number of food companies who register with FDA and prepare a food biosecurity plan
4	Number of Virginia soybean growers aware of Asian soybean rust risk to their crop.
5	Number of Virginia soybean growers who apply fungicide based on Asian soybean rust detection activities.

Outcome #1

1. **Outcome Measures**

Number of animal premises registered in conjunction with the National Animal Identification System

Not Reporting on this Outcome Measure

Outcome #2

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 #3

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

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

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

Brief Explanation

The work previously planned in the Planned Program is being reported in other Planned Programs.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- Time series (multiple points before and after program)

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

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 professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	52.2	1.7	39.4	0.0
Actual	22.6	3.0	19.3	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**
570646	300964	360834	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
739930	371617	1566386	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1448558	306600	3544543	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.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	69100	109800	11700	18600
Actual	76720	106435	17989	3588

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	15	10	
Actual	21	24	45

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educator training workshops

Year	Target	Actual
2009	20	29

Output #2

Output Measure

- Number of field research experiments

Year	Target	Actual
2009	35	78

Output #3

Output Measure

- Number of on-farm demonstrations

Year	Target	Actual
2009	14	37

Output #4

Output Measure

- Number of producer training workshops

Year	Target	Actual
2009	210	324

Output #5

Output Measure

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

Year	Target	Actual
2009	400	322

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase in the amount of agricultural land under best management practices (e.g. nutrient management plans, conservation plans, etc.)
2	Percent increase in gross income from non-organic farming agriculture
3	Increase in farms and acres subject to organic management which will increase overall profitability of organic agriculture (total annual sales).
4	Increase percent of cropland acres subject to improved water conservation practices such as residue management through reduced tillage.

Outcome #1

1. Outcome Measures

Increase in the amount of agricultural land under best management practices (e.g. nutrient management plans, conservation plans, etc.)

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	342000	416000

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 400,000 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 thes BMPs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
131	Alternative Uses of Land
205	Plant Management Systems
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
601	Economics of Agricultural Production and Farm Management

605 Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

Percent increase in gross income from non-organic farming agriculture

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	7	5

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
Overall agricultural profitability has been growing, 1-8%, annual for the last several years in Virginia.

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 #3

1. Outcome Measures

Increase in farms and acres subject to organic management 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	Quantitative Target	Actual
2009	4300000	0

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
Using a $24,000 grant from the Risk Management Agency of USDA, a team of Extension Specialists at Virginia State University joined forces with the Virginia Association for Biological Farming to implement the 2009 Virginia Biological Farming Conference. The program was held on Feb. 27-28, 2009 in Richmond. The conference theme in 2009 was Community Based Food Systems. Leading scientists and successful organic farmers from all over the United States provided 18 presentations concerning organic horticulture, livestock production, pasture management, urban agriculture, farm business management and marketing of organic crops and livestock products.

Results
Over 420 farmers, USDA agriculture professionals, representatives from non-government organizations and youth attended the conference. One of the greatest benefits of this conference is the networking that occurs among these small farm families. Evaluation results indicated that the participants increased their knowledge of organic farming by participating in this program. Virginia producers reported organic sales of $19.2 million, or about 1 percent of all U.S. organic sales.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
131	Alternative Uses of Land
205	Plant Management Systems
403	Waste Disposal, Recycling, and Reuse

601 Economics of Agricultural Production and Farm Management

Outcome #4

1. Outcome Measures

Increase percent of cropland acres subject to improved water conservation practices such as residue management through reduced tillage.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	55	35

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
By 2011, Virginia is committed to making significant reductions of sediment, nitrogen and phosphorus to the Chesapeake Bay waters. The tributary strategies developed for each major watershed are counting on agriculture to
provide the largest share of reductions because pound for pound agriculture can do it more efficiently.

What has been done
The Virginia No-Tillage Alliance (VANTAGE) was created in 2007 to provide a venue for significantly increasing the acres of continuous no-till production in Virginia. Studies have indicated that producers learn best when learning from each other. The VANTAGE program provides for peer-to-peer mentoring opportunities where successful no-till farmers can provide information to those making the transition. VANTAGE is a consortium of farmers, agribusiness and agricultural government organizations that are using no-till systems in their operations or are advising others about these systems. Farmer-run and farmer-oriented, this non-profit organization also serves as a clearinghouse for no-till information and research, and exists to maximize farm productivity and profitability by promoting the successful implementation of no-till practices through shared ideas, technology, conservation and education.

Results
VANTAGE is designed to be a statewide program, with regional chapters that will provide leadership and guidance for producers on the local level. In 2008, the Shenandoah Valley VANTAGE chapter became a reality. Under direction from the board of directors, the first VANTAGE conference was delivered in 2009. Nearly 300 individuals attended this conference, which featured dynamic and informative speakers from all over the country. Also in 2009, a series of "No-Till Challenge" short courses were developed to address very specific challenges that no-till producers face. These courses were extremely well received, and will continue in 2010. A VANTAGE website has been developed and will serve as a clearinghouse for no-till information. This website will also feature an "Ask the Expert" forum, currently under development, where new and experienced producers may share ideas and knowledge.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Case Study
- Other (VDAC Statistics)

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

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	15%	15%	15%	15%
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 professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	30.8	4.0	23.3	4.0
Actual	29.2	3.3	25.0	3.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
738930	318617	467244	696634
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
957958	225132	1566386	627827
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1875737	19000	4589830	166295

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.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	85000	262400	19300	60000
Actual	77053	127866	34975	7965

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	5	10	
Actual	41	55	96

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Target	Actual
2009	600	633

Output #2

Output Measure

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

Year	Target	Actual
2009	750	413

Output #3

Output Measure

- Number of web sites, applications, modules

Year	Target	Actual
2009	50	97

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 gaining knowledge 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 animal premises registered in conjunction with the National Animal Identification System
13	Number of commercial poultry growers adopting biosecurity practices to lower the risk of disease transmission.
14	Studies on supplementation strategies to improve reproductive performance of hair sheep

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	Quantitative Target	Actual
2009	20	8

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 will add value to the Commonwealth's second largest agricultural commodity.

What has been done
Beginning in 1997, Extension Specialists partnered with the Virginia Cattlemen's Association to develop this program which encourages the use of scientifically-based cattle health and management procedures for feeder cattle. The VQA program is a cooperative effort among the Virginia Cattlemen's Association, VDACS, VMRCVM, VCE 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 2009, a total of 11,164 calves were marketed through the VQA program. Producers received a premium of $31 per calf resulting in $346,084 of additional income for Virginia beef producers. Over twelve years of the VQA program, producers have marketed over 99,000 head of feeder cattle resulting in $3.2 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	Quantitative Target	Actual
2009	125	625

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
US consumers are very concerned about the safety and wholesomeness of the food they eat. If beef is to be safe so as 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
The Virginia Beef Quality Assurance Program educates and certifies beef producers in best management practices that improve the safety and quality of beef. $16,800 was secured to carry out the training efforts from the Virginia Beef Industry Council. Agents throughout Virginia have conducted training and demonstrations and have invited producers to make a commitment to conducting their operations in such a manner that quality beef is produced.

Results
The total number of certified producers in Virginia stands at over 4000 which makes Virginia one of the national leaders in BQA activities. During 2009 there were 625 producers either certified or re-certified. These producers came from 50 counties and two surrounding states. We estimate that the certified producers represent over half of the cattle produced in Virginia. Added value of cattle produced on BQA certified farms is estimated to be $1.5 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	Quantitative Target	Actual
2009	25	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
In 2008 and 2009, the program had 160 enrolled herds, representing 24,522 dairy cows or 25% of Virginia dairy cows. There was a measured reduction in the amount of phosphorus fed and thus excreted of 2.65 pounds per cow per year or 32.6 total tons of phosphorus. In addition, $158,975 has been approved for incentive payments to Virginia dairy farms and free feed testing has contributed thousands of dollars in support of better feeding management to reduce environmental pollution potential from dairy farms.

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	Quantitative Target	Actual
2009	30	145

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.

What has been done
In 2009, a team of Extension Specialists, key industry representatives and Area Dairy Agents offered the first annual "Making Quality Milk Conferences" with an emphasis on "Bacterial Counts in Milk". These conferences were held in 6 locations around the state of Virginia. The meetings featured 4 complimentary talks. Two of these talks were given by industry representatives, one talk was given by the local Area Dairy Agent and one by an Extension Specialist. Topics covered included basic information regarding bacterial counts in milk, how to diagnose the problem of high counts, how to prevent high counts and then technology available to help reduce high bacterial counts in milk. These conferences were advertised through the milk processing plants, local agents and newsletters.

Results
A total of 145 participants were accounted for at the 6 locations around the state of VA. Participants were asked to rate their knowledge level prior to the conference and then again at the end of the conference. On a scale of 1-7, participants started with a knowledge level of 3.5 and ended the conference with a knowledge level of 5.5. When asked if they would attend again next year, the median response was 'most likely'. Similarly, when asked if participants would refer the MQM conferences to a friend or co-worker, the median response was 'most likely'. It is our goal to offer these conferences again in 2010 with a rotating theme of interest for each year.

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	Quantitative Target	Actual
2009	25	27

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
State regulations dictate that all swine producers maintaining a no-discharge permit are required to receive periodic continuing education in manure management and environmental protection. The Extension Swine Specialist collaborates with the Virginia Department of Conservation and Recreation (DCR) in developing and delivering this continuing education program. The training is essential for large producers to maintain their permits and stay in compliance with environmental regulations. In addition quality assurance training is required for most producers to maintain market access.

What has been done
An overnight producer learning tour and day-long seminar was conducted introducing swine producers to new methods of manure collection and treatment as well as rotating drum and other new technologies in animal mortality disposal. Other sessions for pork quality and swine transport assurance were conducted to certify producers in these disciplines.

Results
Twenty-seven producers received continuing education credits. A direct impact of the continuing education programs has been the ability of producers holding waste management permits to maintain those permits and operate their farms in an environmentally sound manner through a three year permit. An additional 52 producers were certified in pork quality assurance or transport quality assurance via training sessions. These certification programs allow maintenance of market access and assure customers of safe wholesome pork produced under appropriate animal welfare conditions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals

Outcome #6

1. Outcome Measures

Number of youth gaining knowledge 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	Quantitative Target	Actual
2009	27000	26584

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 serve as a foundation for stimulating career choices in agriculture, and provide 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 competition is 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.

Results
Youth participation in animal projects and embryology totaled 24,321 in 2009. An additional 2,263 youth participated in state-level livestock and horse contests. The ability to observe and evaluate, ability to make decisions, and communication skills were enhanced by the students' participation in these events. State 4H Skillathon (stockmens) team finished first at the national contest, and state 4H Livestock Judging team was third in their national event. 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 $2.3 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	Quantitative Target	Actual
2009	5	15

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 region through field days, publications, and demonstrations.

Results
Sheep numbers in Virginia increased 15% in 2009 according to USDA. With the renewed interest in sheep, Virginia Cooperative Extension assisted local sheep producers with production and marketing endeavors. Direct sales to a local grocery chain resulted in $770,829 in sales. Compared with prices from a regional sheep market, producers were able to receive a $0.19 per pound (estimated $22.80 per head) premium through the local direct marketing arrangement resulting in an additional $46,193 being returned to local farmers above market price.

4. Associated Knowledge Areas

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

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	Quantitative Target	Actual
2009	500	1200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The 2006 Virginia Equine Survey reported a 26% increase in the number of horses and a 41% increase in the number of horse operations since 2001 (NASS Virginia Equine Survey Report, 2008). 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, many lack the necessary horse or pasture management experience to select appropriate feeds and health care products for their animals or to maximize forage production while minimizing the environmental impact of having horses on their small farm. Relative to pastures in particular, this leads to over-grazed pastures lacking grazeable forages resulting increased purchase of hay, grain, and feed supplements, as well as erosion problems. Also, the number of complaints of potential pollution from horse operations held steady at 19% of all founded complaints lodged in 2008 (Ag Stewardship Annual Report, 2009). Educating horse owners on best management practices for equine health and pasture care should allow them to implement said practices and help increase pasture health, decrease expenses associated with hay and feed purchases, and decrease the potential for pollution from horse operations.

What has been done
Four one-day programs and 10 separate presentations were delivered at various Virginia Cooperative Extension and horse industry events. 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; 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; and evaluation of horse health through body condition score, body weight estimation, and growth measurements.

Results
Approximately 1200 Virginians attended the various programs and presentations. In one program in particular, 60 of 109 participants responded to an after-program survey. One of the more highly valued topics included the economics of hay production, where over 30% of participants strongly agreed that they had a better understanding of the costs associated with producing and purchasing hay, and the remaining 70% agreed with the statement. Over 70% learned some or a lot about the topics presented and over 94% found the program to be highly valuable. One participant responded, "Good program, great speakers and topics, and the local knowledge was very helpful!"

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

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	Quantitative Target	Actual
2009	5	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
Site checks were conducted for new producers. 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. Low-density pond production demonstration was conducted at Virginia State University's Randolph Farm. Media promoted shrimp farming.

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 2009 was: 600,000 juveniles, >20,000 lbs produced, value=$180,000. Actual results for 2009 were 550,000 juveniles produced and distributed primarily in the tobacco growing counties of Southside VA; 17,500 lbs harvested and sold at an average price of $8.00/lb for a total value of $140,000. Growth is expected next year as new producers start pond construction. Direct sales continue to be the primary means of marketing. The increased demand for locally produced products and the continued high demand for shrimp resulted in a linkage between producers and VDACS market promotion. Planning has been initiated to establish frozen storage to extend the marketing season.

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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	5	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
By adopting best management practices (BMP) for fish production will increase production level 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 to 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. Five workshops were given that covered BMPs in pond production of fish (Catfish). These workshops 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 in the live fish sales, especially for stocking pond and lakes for urban fishery programs. This represents around 50% of sales for fish farmers. Farmers have increase stocking by 25% to meet previous year demand. Three workshops are planned for 2010 to increase farmer's awareness of BMPs ,especially water quality, for fish farming.

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
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	5	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Many farm pond owners are searching for alternative uses for their farm ponds. Many would like to raise fish for fun and profit. However, these ponds are not suitable for open pond culture of fish without expensive renovation.

What has been done
Three workshops were conducted that showed alternate production methods for farm ponds. Two workshops were conducted showing owners of farm ponds how to construct cages for these ponds. A handout was developed on cage culture for farm ponds that was distributed as part of Aquaculture Field Day program at Virginia State University.

Results
Six pond owners adopted cage production for their farm. One farmer is selling trout to a local farmers market and has plans to smoke fish for further added value. Twenty site visits in conjunction with ANR Agents were conducted to evaluate ponds for alternative aquaculture production methods. A workshop on recirculating systems is planned for 2010. A research proposal is being designed for using tanks production using pond water for 2010.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
311	Animal Diseases

Outcome #12

1. Outcome Measures

Number of animal premises registered in conjunction with the National Animal Identification System

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	10613

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The United States Department of Agriculture's implementation of the voluntary National Animal Identification System will serve to protect the health of the U.S. livestock industry and preserve consumer confidence. The pillar of this process is the registration of individual farms, or premises.

What has been done
VCE implemented the Safeguarding Animal Health program as a comprehensive educational program pertaining to the National Animal Identification System and premise registration in Virginia. VCE collaborates with the Virginia Department of Agriculture and Consumer Services to execute the program and promote premise registration.

Results
Since its inception in 2005, over 25% (10,613) of the estimated livestock premises in Virginia had been registered.

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	300

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Virginia, poultry and egg production contributed approximately $911 million to the economy in 2008, accounting for approximately 34% of all farm commodities. With the continuing threat of disease outbreak in the poultry industry, including widely recognized and publicized Avian Influenza (AI), the importance of biosecurity measures to prevent and limit disease spread are critical.

What has been done
A Biosecurity Audit Program was developed and is reviewed quarterly by the Virginia Poultry Disease Task Force with representatives from academia, industry, and regulatory agencies. As part of this program, commercial poultry producers in Virginia participate in biannual audits of their biosecurity practices. The external Biosecurity Audit team assesses all segments of live production for the commercial broiler, turkey, and egg producers in Virginia to identify biosecurity risks and opportunities for improvements in the control of disease outbreak or spread.

Results
In 2009, seven biosecurity audits were conducted of commercial poultry producers in Virginia. Middle management communicated that as a result of audit reports provided to each company, other company personnel and growers were educated on the identified biosecurity risks, corrective measures were taken by company personnel and growers, and awareness of biosecurity practices was increased. Audits performed this year also provided evidence that additional biosecurity practices and guidelines have been implemented in individual companies in response to suggestions and educational material provided. Since the audits were initiated, the average audit scores (percentage of maximum score achieved) of those companies participating every year have improved from 85% in 2004 to 96% in 2009.

4. Associated Knowledge Areas

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

Outcome #14

1. Outcome Measures

Studies on supplementation strategies to improve reproductive performance of hair sheep

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Rising concern for farm biosecurity and the need to move germplasm efficiently between geographically separate

locations is increasing the need for assisted reproductive technologies in small ruminant production.

What has been done
Virginia State University's (VSU) Agricultural Research Station is conducting research to improve the existing assisted reproductive technology for goat and sheep. In order to maintain an 8-month lambing interval in an accelerated mating system, ewes should conceive early during the breeding season to aid mating in the subsequent breeding cycle. Strategic short term supplementation with melengestrol acetate (MGA) has the potential to synchronize and induce estrus in ewes as they transition between seasonal breeding.

Results
Work with liquid semen for vaginal (shot-in-the-dark) artificial insemination (AI) in yearling ewes during the breeding season using MGA synchronization resulted in an overall pregnancy rate of 75%. Short-term MGA supplementation in June failed to generate a satisfactory estrus response in hair sheep ewes, and additional steps may be needed to induce estrus. Pregnancy rates in this trial were also lower than those achieved previously during the breeding season, and suggest that liquid semen AI should be delayed until late summer or early fall.

Findings from these experiments are providing valuable information for the development of low-cost alternatives for assisted reproduction in sheep and goats that will allow small-scale, limited resource producers to introduce unique animal germplasm to their operation through the use of artificial insemination, and hence improve the genetic base of their herds.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Populations changes (immigration, new cultural groupings, etc.)
- Other (land values near urban areas)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Time series (multiple points before and after program)
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

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
131	Alternative Uses of Land	0%	0%	10%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	20%	0%	20%	50%
206	Basic Plant Biology	0%	0%	15%	0%
212	Pathogens and Nematodes Affecting Plants	20%	0%	20%	0%
302	Nutrient Utilization in Animals	20%	0%	5%	0%
303	Genetic Improvement of Animals	20%	0%	5%	0%
304	Animal Genome	0%	0%	15%	50%
311	Animal Diseases	20%	0%	10%	0%
	Total	100%	0%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	0.8	1.0
Actual	1.3	0.0	1.1	1.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
32898	0	20802	52000
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
42649	0	69736	100000
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
83509	0	204342	0

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, high school teachers

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	130	10	0	0
Actual	99	252	21	132

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	0	50	
Actual	0	73	73

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of research projects in program areas
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of peer reviewed research papers published

Year	Target	Actual
2009	40	73

Output #3

Output Measure

- Number of presentations

Year	Target	Actual
2009	45	63

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Research articles published in peer-reviewed journals
2	Partnerships with high schools
3	Number of presentations, publications and non-peer-reviewed journals disseminating biotechnology research results.
4	Number of projects estimating parameters useful for risk assessment of growth hormone-transgenic Atlantic salmon
5	Number of projects addressing genetic improvement of aquaculture stocks
6	Number of projects assembling transcriptomes for vertebrates and invertebrates from the Southern Appalachian Mountains
7	Projects to aid in identification of bacterial plant pathogens
8	Projects to improve disease resistance and profitability of peanut production through biotechnology
9	Manipulating genomes of insects vectoring diseases

Outcome #1

1. Outcome Measures

Research articles published in peer-reviewed journals

2. Associated Institution Types

- 1862 Research
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	50	73

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Biotechnology, molecular and classical genetics, and genomics are powerful state-of-the-art approaches to the generation of knowledge in most knowledge areas applicable to agriculture. It is important that results of research be peer-reviewed and made available publicly.

What has been done
Research leaders submit completed articles to scholarly journals for peer review and publication.

Results
Knowledge gained from faculty and graduate student research using biotechnology, genetics and genomes has been published in peer-reviewed journals, and several other articles are in press or under review. Additional articles are reported under other planned program areas

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land
201	Plant Genome, Genetics, and Genetic Mechanisms
206	Basic Plant Biology
212	Pathogens and Nematodes Affecting Plants
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
304	Animal Genome
311	Animal Diseases

Outcome #2

1. Outcome Measures

Partnerships with high schools

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of presentations, publications and non-peer-reviewed journals disseminating biotechnology research results.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of projects estimating parameters useful for risk assessment of growth hormone-transgenic Atlantic salmon

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Production of transgenic Atlantic salmon poses benefits to aquaculture, but also poses ecological and genetic risks should such fish escape from aquaculture operations into the wild. Regulatory authorities need reliable estimates of such risks in order to reach defensible decision on whether and how to permit commercial production of transgenic Atlantic salmon expressing an introduced growth hormone gene.

What has been done
Genetic and ecological risks were assessed in the laboratory and in confined, near-natural outdoor systems. Levels of circulating growth hormone, insulin-like growth factor I, and key receptors in the growth-promoting endocrine pathway were quantified. Physiological responses of transgenic and non-transgenic fish to ecologically relevant stressors of heat and starvation were quantified.

Results
Transgenic juveniles matured as parr less frequently than non-transgenics, suggesting that transgene expression diverts energy toward growth and smoltification. Transgenic individuals had poor breeding performance in competitive breeding experiments among transgenic and wild adults. Growth hormone expression was highest at

earliest life stages and declined as the fish grew in size. Plasma GH and IGF levels in salmon from approximately 50g to 6 kg did not differ significantly between transgenics and controls. Wild-type fish maintained homeostasis more effectively than transgenic fish, showing lower fluctuations in all measured hematological parameters.

4. Associated Knowledge Areas

KA Code	Knowledge Area
304	Animal Genome

Outcome #5

1. Outcome Measures

Number of projects addressing genetic improvement of aquaculture stocks

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The tools of quantitative and genomic genetics can be applied for improvement of cultured finfish stocks, thereby contributing to aquaculture's productivity and profitability.

What has been done
In this project, we are characterizing genetic variation for: (1) ability to effectively utilize plant-based feeds by rainbow trout, (2) resistance to cold water disease in rainbow trout, and (3) resistance to herpes virus 3 in common carp.

Results
Collaborators in Israel have spawned the families needed for mapping of disease resistance onto genetic markers. Twenty-four candidate genes for which sequence data are available have been screened for polymorphisms between the parental strains. Frequencies of DNA sequence variants at Toll-like receptor genes differed among strains of common carp that are either resistant or susceptible to herpes virus 3, suggesting an approach to marker-assisted breeding of disease resistant broodstock.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
304	Animal Genome
311	Animal Diseases

Outcome #6

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The southeastern United States is the global center of biodiversity for freshwater organisms. Common actors driving the imperilment of aquatic and terrestrial species in the southern Appalachians include habitat alteration, siltation, and pollution. Advances in knowledge of functional genomics will contribute to the understanding of the mechanisms through which such drivers impact declining species. We are conducting pioneering work to characterize gene expression in vertebrate and invertebrates of the southern Appalachian region.

What has been done
Using data sets provided by collaborators at the U.S. Geological Survey - Biological Resources Division, we are applying bioinformatic techniques in order to perform transcriptome assembly for vertebrate and invertebrate genomes, identifying gene models, assigning gene names, classifying gene families, aligning DNA sequences among related species, and assessing gene ontology.

Results
Raw sequencing data has been obtained for three freshwater mussel species. The quality of the raw data has been assessed and is sufficiently high to initiate assembly of the transcriptome.

4. Associated Knowledge Areas

KA Code	Knowledge Area
304	Animal Genome

Outcome #7

1. Outcome Measures

Projects to aid in identification of bacterial plant pathogens

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The taxonomy and nomenclature of bacterial plant pathogens has undergone frequent changes because our knowledge with regard to the relatedness between different bacterial plant pathogens is still far from complete. Moreover, information on well-characterized reference strains that can be used for comparison with unknown strains is not easily accessible. This imposes serious limitations when diagnosing the causes of plant diseases.

What has been done
To precisely identify strains belonging to species of plant pathogenic bacteria, a database with an Internet-accessible interface has been developed. The name is PAMDB (Plant Associated Microbes Database) and the web address is www.pamdb.org. The website makes it easy for users to browse and search the PAMDB database and to add new strain data and new DNA sequence data.

Results
To date, 1,299 DNA sequences from 794 strains belonging to four bacterial species that cause plant disease have been added to the PAMDB database. Availability of this information facilitates identification of plant pathogens and diagnosis of the diseases they cause. A plant pathologist can now compare the DNA sequence of an unknown pathogen and compare it with the 1,299 DNA sequences in the database. If the unknown pathogen belongs to one of the four species already added to PAMDB, the unknown pathogen can then be precisely identified by comparison with the DNA sequences of the known plant pathogenic strains in the database.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants

Outcome #8

1. Outcome Measures

Projects to improve disease resistance and profitability of peanut production through biotechnology

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia peanut production has experienced a steep decline in the Virginia-North Carolina growing region as a result of decreased price supports and high disease pressure from Sclerotinia blight and other fungal diseases. The cost of fungicides for control of these fungal diseases can account for up to 50% of production costs. Peanut acreage in VA decreased from 75,000 to 23,000 acres in a six-year period, resulting in economic impact to Tidewater communities.

What has been done
Research has focused on using biotechnology and genetic engineering to improve resistance to Sclerotinia blight. Six years of field trials with transgenic peanuts have demonstrated a reduction in blight incidence and disease severity, and increased yields. Information needed to complete documents requesting deregulation and approval for commercial release is being obtained. The consultative process with USDA-APHIS, EPA, and FDA has begun.

Results
Field trials have verified expression of oxalate oxidase in transgenic peanut and its heritability through multiple generations. Oxalate oxidase increased resistance to Sclerotinia but did not alter susceptibility to virus, early leaf spot, or other diseases. Trials show gene flow, growth habit, pod development, maturity, market traits, fatty acid profiles and minerals were identical to non-transgenic peanuts. Anticipated availability of Sclerotinia resistant cultivars will improve disease control, reduce production costs and pesticide usage, and result in higher yields. A white paper on the larger issue of transgenic traits of peanuts was prepared for various industry groups, raising awareness of the importance and value of this initiative to stakeholders.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
206	Basic Plant Biology
212	Pathogens and Nematodes Affecting Plants

Outcome #9

1. Outcome Measures

Manipulating genomes of insects vectoring diseases

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual

2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Vector-borne diseases such as dengue fever and malaria are increasing, with severe epidemics occurring worldwide. Vaccinations, chemotherapeutics, insecticides, source reduction and education have not yet been sufficient to control these severe public health crises. While additional progress in all these areas must be made, it is vital to develop any technologies that can supplement the tools we already possess. Genetic control strategies aimed at manipulating the genome of the disease vector offer the potential to support these efforts.

What has been done

A project has been established to manipulate the genome or expression of transgenes in disease vector mosquitoes. Objectives include identifying novel promoter sequences capable of driving gene expression, improving mosquito transposition rates, and improving site-specific recombination rates. We have also begun to evaluate the potential of homing endonucleases to introduce breaks in the chromosomes of mosquitoes that are vector diseases.

Results

The expression of two novel promoters derived from mosquito ubiquitin genes in transgenic Aedes aegypti (yellow fever mosquito) have been characterized. Both exhibit constitutive expression during larval development, but have unique expression patterns in adults. Several heat-inducible promoters with robust activity in early embryos have also been characterized. Four recombinant homing endonucleases have been used to generate chromosomal breaks and gene excision in mosquito DNA. This can be a novel assay to determine whether a meganuclease can induce chromosomal breaks in disease vector mosquitoes. Such tools are helpful for basic research to understand mosquito-virus interactions and for applications to generate mosquito populations unable to transmit arboviruses such as those causing dengue or yellow fever.

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Other (research)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Economics and Commerce

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	20%	30%	10%	0%
603	Market Economics	10%	30%	20%	0%
604	Marketing and Distribution Practices	10%	15%	20%	0%
605	Natural Resource and Environmental Economics	5%	5%	20%	0%
607	Consumer Economics	20%	0%	5%	0%
608	Community Resource Planning and Development	10%	15%	5%	0%
610	Domestic Policy Analysis	5%	5%	10%	0%
801	Individual and Family Resource Management	15%	0%	5%	0%
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	5%	0%	5%	0%
	Total	100%	100%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	30.0	0.0	12.6	0.0
Actual	27.9	2.0	23.8	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**
704767	126723	445642	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
445642	55544	1493967	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1789017	1000	4377629	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. Research in personal finance issues and evaluation of programming will be conducted to improve financial literacy. Financial literacy curriculum will be developed using proven delivery methods. 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.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	34900	86500	6900	17100
Actual	37514	172311	22301	4657

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

Patent Applications Submitted

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	5	10	
Actual	9	32	196

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of education programs planned in public policy education

Year	Target	Actual
2009	20	5

Output #2

Output Measure

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

Year	Target	Actual
2009	50	104

Output #3

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	Target	Actual
2009	3000	20000

Output #4

Output Measure

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

Year	Target	Actual
2009	50	160

Output #5

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	Target	Actual
2009	10	10

Output #6

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	Target	Actual
2009	3000	8350

Output #7

Output Measure

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

Year	Target	Actual
2009	500	1322

Output #8

Output Measure

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

Year	Target	Actual
2009	20	102

Output #9

Output Measure

- Number of education programs conducted in marketing and direct marketing

Year	Target	Actual
2009	20	37

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage of transitional plans completed by farm family program participants
2	Percentage of farmers, agricultural business managers and leaders, food processors, government agencies, and agribusiness firm program participants learn how to make more informed business and economic decisions
3	Percentage of individuals and family program participants completing basic financial management strategies such as budgeting, setting financial goals, establishing a saving/investing program after receiving financial instruction.
4	Percentage of trained volunteers and citizens participating in entrepreneurship workshops indicating increased entrepreneurial knowledge and skills applied to evaluation and planning of new enterprises (such as small businesses, micro businesses, homebased businesses and agritourism) as a result of participation in extension programs.
5	Percentage of communities and local governments partnering with Virginia Cooperative Extension faculty that seek and develop alternative economic development opportunities, or address public policy and community planning goals.
6	Percentage of program participants improving their housing environment through ownership, avoiding foreclosure or purchasing and maintaining a home.
7	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.
8	Market development for Live Cobia
9	Financial performance of limited resource and small farms
10	Supporting community-based food systems
11	Capacity Building in Latin America
12	Beef Cattle Process Verification and Marketing Program
13	Marketing Club Teaches Commodity Price Risk Management Skills

Outcome #1

1. Outcome Measures

Percentage of transitional plans completed by farm family program participants

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	66

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
A smooth transition to the next generation of farmers is essential but challenging, given financial risks of start-up costs, tight profit margins, and escalating values of farm assets, as well as increasing development pressures facing agriculture. Farm families are grappling with these succession issues, trying to sustain viable farm businesses for the next generation while providing adequate retirement for exiting operators.

What has been done
"Managing the Farm Transition" workshops were delivered in 10 locations. The curriculum provides instruction on issues of intra-family communication, goal setting, tax planning, business evaluation, legal documents in retirement and estate planning, and insurance. The series provided opportunities for homework and case study work that encourages the actual development of a transition plan. The program utilized grants of $18,000 from the VDACS Office of Farmland Protection.

Results
Form one workshops, 29 individuals representing fifteen farms participated in the workshop series. Eight family farms attended the last workshop and completed the end of workshop evaluation. The eight farms represent over 3,450 acres with a fair market value $ 8,625,000. On a scale of 1 (Excellent) to 5 (Poor) participants rate the overall value of the series at 2.0. A goal of the workshops was to have participants develop a farm transition plan for their farm. Evaluations showed the following actions taken: 66% had or plan to write both personal and farm goals; conducted a family meeting; completed an inventory of farm & non-farm assets; and developed a written transition management plan. Responses to the question "What was the most important thing learned?" included: "importance of communication with family members;" "set goals and timelines;" "seek professional help." After the workshop, one farmer requested more options and methods for transferring assets to another generation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
605	Natural Resource and Environmental Economics
610	Domestic Policy Analysis
801	Individual and Family Resource Management

Outcome #2

1. Outcome Measures

Percentage of farmers, agricultural business managers and leaders, food processors, government agencies, and agribusiness firm program participants learn how to make more informed business and economic decisions

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	60

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia's dairy industry is struggling with both viability and long-term sustainability due to an ongoing cost-price squeeze and lack of skills in financial record keeping and use of financial records as a management tool .

What has been done
VCE, assisted by Farm Credit, developed and conducted a financial management training program for dairies known as the Dairy Management Institute (DMI) for the past eight years. Dairy farmers evaluate their financial health to ensure their business is structured and managed for competitiveness and growth. Readily accessible financial and production data is used to benchmark individual farms year-to-year and to industry standards.

Results
Sixty VA farms participated in DMI and 69% have participated for more than two years, some 8 years. Evaluations showed that 100% of the dairies felt that the intensive analysis was worth their effort to provide their financial and production information. 75.9% of the farms considered it beneficial to compare their dairies financial status to a comparable group average. On a scale of 1 to 5, with 5 being Very Knowledgeable, participating dairies ranked their level of knowledge and skill of financial management, 0.31 higher at the end of DMI compared to the beginning (A 3.41 rating at the beginning and 3.72 at the end). Over 51% of the dairies indicated that DMI has helped them control expenses and has made them more profitable, though no farmer was willing to provide a dollar estimate of savings. A quote from a first time participant; "Painful and a very humbling experience but a very good look at our dairy. We will be back."

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
610	Domestic Policy Analysis

Outcome #3

1. Outcome Measures

Percentage of individuals and family program participants completing 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
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	80	80

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In 2008, VA the number of non-business bankruptcy filings 28,212 or 3.7 out of every 1,000 residents. In the first three quarters of 2009 there have been 27,366 or an annualized figure of 4.7 out every 1,000 residents. Over 740,000 Virginians live in poverty. Over 26,000 families receive TANF aid each month. On a seasonally adjusted basis, Virginia's unemployment rate moved up from 4.2percent in October 2008 to 6.3 percent in October 2009. The foreclosure rates are up and the housing and stock markets are only slowly recovering.

What has been done
Classes and workshops have been held across the state for a wide variety of audiences. Over 20,000 individuals have attended the workshops. audiences included low-income and middle class individuals and families, male and female offenders, English and Spanish speakers, urban and rural individuals and families and people going through bankruptcy.

Results
Based on a range of 73-100% of participants reporting a change in financial behavior between 14,600 and 20,000 citizens of the Commonwealth of Virginia improved their financial management behaviors such as budgeting, saving for emergencies, and investing to reach written financial goals. In addition to the above it is estimated that 50,000 citizens have been reached by TV and Radio programs and the Living Well Newsletter.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Percentage of trained volunteers and citizens participating in entrepreneurship workshops indicating increased entrepreneurial knowledge and skills applied to evaluation and planning of new enterprises (such as small businesses, micro businesses, homebased businesses and agritourism) as a result of participation in extension programs.

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	500	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The foreclosure rates are up and the housing and stock markets are only slowly recovering. In 2008, VA the number of non-business bankruptcy filings 28,212 or 3.7 out of every 1,000 residents. In the first three quarters of 2009 there have been 27,366 or an annualized figure of 4.7 out every 1,000 residents. Over 740,000 Virginians live in poverty. Over 26,000 families receive TANF aid each month. On a seasonally adjusted basis, Virginia's unemployment rate moved up from 4.2percent in October 2008 to 6.3 percent in October 2009.

What has been done
Virginia Cooperative Extension offers classes on home ownership, avoiding foreclosure, reverse mortgages, and clean and healthy homes. We also offer one-on-one counseling sessions.

Results
On average 78% of the families receiving reverse mortgage counseling get a reverse mortgage and 50% of families avoid foreclosure on their homes. Also about 47% of families improve their credit and qualify to purchase their first home. Agents work closely with the Virginia Housing Development Authority and with HUD programs. Eighty percent of participants in clean and healthy programs change at least one behavior to improve the quality of their living space.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

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.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	3000	8350

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Financial Literacy is an important topic for all ages. in 2005 Virginia enacted a law requiring 15 economic and financial literacy topic be taught in Virginia schools. In 2009 they added 1credit class required for graduation (one semester of economics and one of personal finance).

What has been done
Virginia Cooperative Extension trains teachers and works directly with youth to improve financial literacy. Kid's Market Place for young children and Reality Store for Middle School and High School along with Camp Millionaire(r)are most popular programs. We also work with teachers on using the NEFE's (National Endowment for Financial Planning) High School Financial Planning Program which provides free materials to students and

Results
Where impacts are reported 80-100% of the youth and teachers report they learned something that will improve their financial behavior now and in the future.

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Market development for Live Cobia

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Sales of domestically raised cobias are limited. VA Seafod AREC is working directly with Virginia Cobia Farms (VCB in Saltville, Va) to increase markets and sales. VCB is exploring development of a product for domestic sale. VCB is uncertain if the fish might sell and hadn't made a decision on which marketing channel they would try to enter first.

What has been done
A small test market was set up in Washington, D.C. in the summer of 2009 to determine if Cobia could be sold live in the ethnic or international markets. Although small a sample, completed surveys form from at home consumption indicated that all "they would buy the fish at least once a month." VCB is now getting a larger quantity of fish ready to sell. Further survey work will be done when that happens.

Results
Before the test market VCB was unsure if they could sell live cobia. Now after seeing the results of the test market VCB has decided to make the live marketing channel their first sales target.

4. Associated Knowledge Areas

KA Code	Knowledge Area
603	Market Economics
605	Natural Resource and Environmental Economics

Outcome #9

1. Outcome Measures

Financial performance of limited resource and small farms

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	548

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Over 90 percent of farm operations in the United States are considered small farms (sales less than $250,000), and nearly 10 percent of small farms are considered limited resource (gross sales less than $100,000), and the disturbing statistic is that over 80 percent of limited resource farms have a negative profit margin. Many limited resource farms are unaware of their financial condition because the deficit is masked by off-farm income sources.

What has been done
Virginia State University personnel and USDA collaborators have provided educational outreach opportunities (hands-on demonstrations, computer training, and risk management workshops) and direct technical assistance to socially disadvantaged and limited resource farmers in 24 Virginia counties.

Results
Virginia State University's Small Farm Outreach and Technical Assistance Program (VSU-SFOTAP) provided direct one-on-one, technical assistance to 743 socially disadvantaged and limited resource farmers to improve farm production and marketing, write business and marketing plans, and apply for USDA farm program funds. As a result of participating in VSU-SFOTAP educational outreach and technical assistance programs, 548 farms saved a total $396,200.00 (average savings per farm: $723.00), and 510 farms earned a total of $342,750.00 (average increased income per farm: $672.00).

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
610	Domestic Policy Analysis

Outcome #10

1. Outcome Measures

Supporting community-based food systems

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	75

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia farmers are struggling with economic profitability, uncertainty and viability and individuals have increased incidences of obesity, diabetes, diet-related diseases. Local fresh healthy food opportunities throughout Virginia's food system can improve agricultural economic vitality and strengthen community health and well-being.

What has been done
VCE has been actively leading, assisting and educating Virginians on the role and importance of community-based food systems to local agriculture, local economies, and local communities. VCE led a collaboration to complete two two-day workshops attracting over 200 individuals on food entrepreneurship and business development for Virginia's local agriculture and value-added food producers.

Results
VCE's support and educational programs have helped develop, seven Buy Fresh Buy Local chapters. Currently collaborating, to produce a 23-county Farmer-Chef directory, support 3 local food hubs, and help 30 school divisions purchased local foods for their cafeterias. Support use of EBT Farmers Market Incentive Program for SNAP benefits at a farmers market. These activities have generated more than $100,000 in economic impact connecting rural producers and growers with local food markets and institutions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
603	Market Economics
604	Marketing and Distribution Practices

Outcome #11

1. Outcome Measures

Capacity Building in Latin America

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The majority of the world lives in developing countries, many of them in rural areas. Agricultural pests cause crop losses, management of them creates additional costs to producers, and application of pesticides is associated with heavy damage to the environment. The IPM CRSP is multi-university project that addresses pest problems in Ecuador and Honduras in Latin America.

What has been done
This project has involved social and production scientists to identify pest problems, prioritize and conduct research, and use the research to benefit developing-country farmers. Our research is participatory; we conduct research in laboratories, at experiment stations and farmer fields and involve graduate students and host-country undergraduates.

Results
We identified and tested a number of IPM packages to address pest problems in cacao, plantain, Andean fruits, and vegetables. These packages are associated with lower production costs, increased yields and less environmental damages. National research institutes in both countries are now heavily invested in IPM research, farmers are better off and adoption is spreading over time. We have also graduated a number of host-country scientists who returned to their countries with advanced degrees, thus building capacity in these important areas.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
603	Market Economics

Outcome #12

1. Outcome Measures

Beef Cattle Process Verification and Marketing Program

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	425

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Beef exports are down as a result of BSE in the United States, leading to less demand for U.S. cattle. In 2006, USDA instituted procedures for a Process Verification Program whereby beef producers could voluntarily participate in traceability programs that documented cattle age and source of origin from which product from qualified animals would be eligible for export.

What has been done
A collaborative effort between VCE, Virginia Cattlemen's Association, Southeast Livestock Network, and cattle producers was established for Virginia cattle producers to USDA Process Verify their animals. VCE agents and beef industry leaders received in-depth training and became certified to implement USDA Process Verification standards.

Results
Since program initiation in 2006, over 425 beef cattle producers have been enrolled as USDA-approved suppliers. These producers have marketed over 30,000 calves as USDA Process Verified, which contributed to $500,000 in value added income for Virginia beef producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
603	Market Economics
604	Marketing and Distribution Practices

Outcome #13

1. Outcome Measures

Marketing Club Teaches Commodity Price Risk Management Skills

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	28

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Virginia grain producers are experiencing a dramatic increase in their breakeven costs coupled with increase price volatility. Price volatility has driven grain elevators to imposed bushel restrictions on cash contracts, the most popular tool for forward pricing. Commodity price risk has never been greater, and farmers have expressed a need for educational programs in this area.

What has been done
The Eastern Virginia Marketing Club has conducted programs since 2003. The club met 4 times in 2009 with 28 participants. Topics covered included crop insurance, enterprise budgeting, hedging with futures and using options on futures, and ACRE.

Results
As a result of participation in the club, all participants have increased their knowledge in the areas of crop insurance, hedging with futures, determining break-even prices for crops, and using options on futures and are using at least one practice to help manage price risk.

4. Associated Knowledge Areas

KA Code	Knowledge Area
603	Market Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Families, Youth, 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	20%	20%	34%	0%
802	Human Development and Family Well-Being	30%	30%	33%	0%
806	Youth Development	50%	50%	33%	0%
	Total	100%	100%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	107.0	3.0	0.0	0.9
Actual	116.2	2.5	20.9	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**
2940029	332649	390917	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
3811492	34385	1310507	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
7463122	10500	3840053	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Activities include entrepreneurial education, asset-based economic development, leadership, civic engagement, 4-H camping programs, 4-H after-school programs, 4-H in-school programs, 4-H clubs, 4-H special interest groups, 4-H Cloverbud groups, district 4-H trainings, local 4-H trainings, home school education, 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

Youth between the ages of 5 -19, 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.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	227900	245200	453800	488200
Actual	186087	267815	700002	463677

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	5	0	
Actual	103	0	103

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	Target	Actual
2009	3500	3346

Output #2

Output Measure

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

Year	Target	Actual
2009	55	117

Output #3

Output Measure

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

Year	Target	Actual
2009	140000	69242

Output #4

Output Measure

- Number of citizens receiving entrepreneurial education

Year	Target	Actual
2009	900	2304

Output #5

Output Measure

- Number of youth and adults engaged in leadership development education

Year	Target	Actual
2009	5000	7939

Output #6

Output Measure

- Number of clubs where youth are involved in structured after school programming

Year	Target	Actual
2009	2200	198

Output #7

Output Measure

- Number of programs offered regarding community food systems.

Year	Target	Actual
2009	10	16

Output #8

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	Target	Actual
2009	10	10

Output #9

Output Measure

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

Year	Target	Actual
2009	10	40

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage of adult citizens participating in leadership development education programs indicating increased knowledge, skills, and attitudes as a result of participation.
2	Percent of parenting education participants increasing knowledge in understanding child development
3	Percent of parenting education participants increasing knowledge of effective parenting practices, such as nurturing and guiding children
4	Percent of parenting education participants adopting practices of effective parenting, such as nurturing and guiding.
5	Percent of parenting education participants who increase knowledge of community resources available to meet family needs.
6	Percent of parenting education participants adopting practices to reduce family conflict and manage stress
7	Percent of parenting education participants increasing knowledge of practices to reduce family conflict and manage stress
8	Percent of early childhood professional development participants implementing one strategy to improve relationships with enrolled families
9	Number of youth, or parents of youth, reporting a positive change in life skills as a result of participation in a 4-H camp.
10	Number of youth reporting positive attitude change and/or aspirations related to volunteering and community service.
11	Number of youth and adults demonstrating an increase in knowledge and/or skills in animal sciences.
12	Number of youth through communication and expressive arts programming demonstrate increased self efficacy in public speaking, presentations, visual arts, and performing arts
13	Number of 4-H youth participating in foods, nutrition, and health programs demonstrating healthy living choices.
14	Number of youth participants in 4-H natural resources and environmental education programs demonstrating environmentally responsible behavior
15	Number of youth participants studying plant, soils, and entomology who have learned the interconnectedness of organisms and their environment
16	Number of youth demonstrating an increase in knowledge and/or skills in science and technology.
17	Number of volunteers completing a training program and successfully leading a program, activity, event, or club.
18	Number of youth reporting positive attitude change and/or aspirations about learning and careers in a 4-H project area.

19	Number of youth indicating increased knowledge/skills related to economic education and/or entrepreneurship.
20	Number of youth indicating increased knowledge and/or skills related to leadership.
21	Number of youth or parents of youth indicating a postive change in behavior and attitudes as a result of particpating in 4-H Character Counts! activities and programs.
22	Percentage of trained volunteers and citizens participating in facilitation skills training indicating increased knowledge, skills, and attitudes as a result of participation.
23	Number of local communities partnering with Virginia Cooperative Extension faculty to increase resources to address poverty issues
24	Number of local communities partnering with Virginia Cooperative Extension faculty to address community food systems issues
25	Percentage of trained volunteers and citizens participating in food-based business workshops indicating increased understanding/knowledge of food-based businesses as a result of participation.
26	Percentage of adult 4-H volunteers participating in leadership and volunteer development trainings indicating increased knowledge, skills, and attitudes as a result of participation.
27	Percent of parenting education participants increasing knowledge of using available community resources to meet their needs.
28	Percentage of early childhood professional development participants increasing knowledge of appropriate health, safety and nutrition practices
29	Percentage of early childhood professional development participants adopting appropriate health, safety and nutrition practices.
30	Percentage of early childhood professional development participants increasing knowledge of basic child development
31	Percentage of early childhood professional development participants adopting developmentally-appropriate practices
32	Percentage of early childhood professional development participants increasing knowledge of appropriate child observation and assessment
33	Percentage of early childhood professional development participants increasing knowledge of the components of an effective learning environment
34	Percentage of early childhood professional development participants increasing knowledge of effective interaction strategies.
35	Percentage of early childhood professional development participants implementing at least one strategy to improve program management practices.

Outcome #1

1. Outcome Measures

Percentage of adult citizens participating in leadership development education programs indicating increased knowledge, skills, and attitudes 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	Quantitative Target	Actual
2009	70	70

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Communities face increasing operational costs, stagnant revenue, growing taxpayer demands, and a lack of citizens who accept community leadership roles. In a recent Situation Analysis, 114 issues related to the need for training in leadership, ethics/values, and community development were listed.

What has been done
Cooperative Extension's grassroots leadership development curriculum, Innovative Leadership: Building Community Connections, was offered in four Virginia communities. 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
Four leadership classes were held with 61 residents completing the training and engaging in dialogue with government officials. Since Innovative Leadership was first offered in 2007/2008, 180 community residents have completed the training. Program evaluation questionnaires were delivered to 119 program participants who participated in the program during 2008 or 2009 (both completers and non-completers) with 23% (n=27) of the participants completing and returning the questionnaire. Only one (1) program non-completer returned the questionnaire indicating the reason for non-completion was a personal issue of "bad timing in life". Of the program completers who returned the questionnaire (n=26),

* 46% reported an appointment to a decision-making group within the community.

* 69% reported an increase in community engagement after completing the program indicating that they were more visible in the community, attending meetings of the governing body, monitoring county legislation, serving on community watch groups, and engaging in other community activities.

* 57% reported an increase in networking with community leaders.

* 69% believed their participation in Innovative Leadership provided them the ability to lead more effectively.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #2

1. Outcome Measures

Percent of parenting education participants increasing knowledge in understanding child development

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	90

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In FY 2008, 35 Virginia, children died from abuse and neglect, and there were 6,099 victims. Concerns about how families are functioning and adapting to problems such as poverty, unemployment, inadequate housing, and parental conflict have economic impacts for the family and the Commonwealth. Poor adjustment in children and youth is linked to negative outcomes in adulthood. Reducing at risk behaviors while promoting resiliency in children and families is critical to reducing the financial and emotional cost to families and communities.

What has been done
To address parenting issues, agents partnered with local schools and agencies. Educational programming focused on effective parenting techniques, communication and positive discipline were provided to an array of audiences, including DSS referred or court ordered parents, teen parents, workplace audiences, welfare to work audiences, Title I parents, preschool public education program parents, alternative school students, grandparents and other relatives raising grandchildren, and workshops for women in local battered women's shelter care.

Results
A total of 1628 parents or primary caregivers participated in parenting education classes in 2009. Survey respondents indicated that:
90% of parents increased knowledge in understanding child development
91% of parents increased knowledge of effective parenting practices
91% of parents increased knowledge in nurturing parenting practices
96% of parents increased knowledge in guiding children's behavior

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Percent of parenting education participants increasing knowledge of effective parenting practices, such as nurturing and guiding children

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	91

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In FY 2008, 35 Virginia, children died from abuse and neglect, and there were 6,099 victims. Concerns about how families are functioning and adapting to problems such as poverty, unemployment, inadequate housing, and parental conflict have economic impacts for the family and the Commonwealth. Poor adjustment in children and youth is linked to negative outcomes in adulthood. Reducing at risk behaviors while promoting resiliency in children and families is critical to reducing the financial and emotional cost to families and communities.

What has been done
To address parenting issues, agents partnered with local schools and agencies. Educational programming focused on effective parenting techniques, communication and positive discipline were provided to an array of audiences, including DSS referred or court ordered parents, teen parents, workplace audiences, welfare to work audiences, Title I parents, preschool public education program parents, alternative school students, grandparents and other relatives raising grandchildren, and workshops for women in local battered women's shelter care.

Results
A total of 1628 parents or primary caregivers participated in parenting education classes in 2009. Survey respondents indicated that:
90% of parents increased knowledge in understanding child development
91% of parents increased knowledge of effective parenting practices
91% of parents increased knowledge in nurturing parenting practices
96% of parents increased knowledge in guiding children's behavior

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Percent of parenting education participants adopting practices of effective parenting, such as nurturing and guiding.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	92

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In FY 2008, 35 Virginia children died from abuse and neglect, and there were 6,099 victims. Concerns about how families are functioning and adapting to problems such as poverty, unemployment, inadequate housing, and parental conflict have economic impacts for the family and the Commonwealth. Poor adjustment in children and youth is linked to negative outcomes in adulthood. Reducing at risk behaviors while promoting resiliency in children and families is critical to reducing the financial and emotional cost to families and communities.

What has been done
To address parenting issues, agents partnered with local schools and agencies. Educational programming focused on effective parenting techniques, communication and positive discipline were provided to an array of audiences, including DSS referred or court ordered parents, teen parents, workplace audiences, welfare to work audiences, Title I parents, preschool public education program parents, alternative school students, grandparents and other relatives raising grandchildren, and workshops for women in local battered women's shelter care.

Results
A total of 1628 parents or primary caregivers participated in parenting education classes in 2009. Based on evaluation results in one community with 86 parent participants, 92% of parents adopted practices of effective parenting, such as nurturing and guiding children. Several parents also stated that as a result of attending the 8 week courses they were able to make behavioral changes that resulted in regaining custody of their children.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Percent of parenting education participants who increase knowledge of community resources available to meet family needs.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	25	96

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In FY 2008, 35 Virginia children died from abuse and neglect, and there were 6,099 victims. Concerns about how families are functioning and adapting to problems such as poverty, unemployment, inadequate housing, and parental conflict have economic impacts for the family and the Commonwealth. Poor adjustment in children and youth is linked to negative outcomes in adulthood. Reducing at risk behaviors while promoting resiliency in children and families is critical to reducing the financial and emotional cost to families and communities.

What has been done
To address parenting issues, agents partnered with local schools and agencies. Educational programming focused on effective parenting techniques, communication and positive discipline were provided to an array of audiences, including DSS referred or court ordered parents, teen parents, workplace audiences, welfare to work audiences, Title I parents, preschool public education program parents, alternative school students, grandparents and other relatives raising grandchildren, and workshops for women in local battered women's shelter care.

Results
A total of 1628 parents or primary caregivers participated in parenting education classes in 2009. Survey respondents indicated that 96 percent of parents know how to access community resources to help address their family needs.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Percent of parenting education participants adopting practices to reduce family conflict and manage stress

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	40	85

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In FY 2008, 35 Virginia children died from abuse and neglect, and there were 6,099 victims. Concerns about how families are functioning and adapting to problems such as poverty, unemployment, inadequate housing, and parental conflict have economic impacts for the family and the Commonwealth. Poor adjustment in children and youth is linked to negative outcomes in adulthood. Reducing at risk behaviors while promoting resiliency in children and families is critical to reducing the financial and emotional cost to families and communities.

What has been done
To address parenting issues, agents partnered with local schools and agencies. Educational programming focused on effective parenting techniques, communication and positive discipline were provided to an array of audiences, including DSS referred or court ordered parents, teen parents, workplace audiences, welfare to work audiences, Title I parents, preschool public education program parents, alternative school students, grandparents and other relatives raising grandchildren, and workshops for women in local battered women's shelter care.

Results
A total of 1628 parents or primary caregivers participated in parenting education classes in 2009. Survey respondents indicated that
85% of parents adopted practices to reduce family conflict and manage stress.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Percent of parenting education participants increasing knowledge of practices to reduce family conflict and manage stress

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In FY 2008, 35 Virginia children died from abuse and neglect, and there were 6,099 victims. Concerns about how families are functioning and adapting to problems such as poverty, unemployment, inadequate housing, and parental conflict have economic impacts for the family and the Commonwealth. Poor adjustment in children and youth is linked to negative outcomes in adulthood. Reducing at risk behaviors while promoting resiliency in children and families is critical to reducing the financial and emotional cost to families and communities.

What has been done
To address parenting issues, agents partnered with local schools and agencies. Educational programming focused on effective parenting techniques, communication and positive discipline were provided to an array of audiences, including DSS referred or court ordered parents, teen parents, workplace audiences, welfare to work audiences, Title I parents, preschool public education program parents, alternative school students, grandparents and other relatives raising grandchildren, and workshops for women in local battered women's shelter care.

Results
A total of 1628 parents or primary caregivers participated in parenting education classes in 2009. Survey respondents from one court-ordered parenting class for parents involved with child protective services indicated that:
61% of participants stated they learned at least 1 new way to communicate positively with their children, spouse or parent of their child.

30% of those attending the court-ordered parenting classes stated they would attend future parenting classes voluntarily to improve communication and relationships with their children.

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Percent of early childhood professional development participants implementing one strategy to improve relationships with enrolled families

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	95

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There are 599,000 children under the age of 6 in Virginia, 62% of whom are routinely cared for by someone other than their parents. One in five Virginia children enters kindergarten without the basic skills needed to succeed. Yet research shows that the first five years of life are crucial to children's long term cognitive, social and emotional development. Additionally, every dollar that is invested in high quality childcare and early childhood education returns $7 to $8 to society by reducing cost related to crime, special education and welfare and increasing revenues through improved employee productivity.

What has been done
VCE conducted early childhood educator trainings across the state. Workshops on a variety of topics related to high quality early childhood education were provided, including safety and emergency preparedness, working with parents, strategies for working with children with developmental delays, recognizing and reporting abuse and neglect, adult-child interactions, infant and toddler development, age-appropriate learning activities for science, art, and school-age children.

Results
A total of 2196 early childhood educators, who care for 20,684 children attended trainings. At one of the largest trainings, 95% of respondents reported implementing a new strategy to improve relationships with the families of the children in their care in a three to six months follow-up survey.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Number of youth, or parents of youth, reporting a positive change in life skills as a result of participation in a 4-H camp.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	200	16431

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Positive youth development focuses on building skills that youth need to be successful, contributing members of society. The Community Network for Youth Development identifies development of independence skills as an important step in youth learning to be productive, connected and to navigate the world. In an increasingly structured and supervised environment, youth need opportunities to practice independence skills including decision-making, problem-solving and planning.

What has been done
Independence is fostered through attending short term residential camping programs. Youth attending 4-H Junior camp develop independence by practicing decision making through daily programming activities, choosing schedules and making personal living choices. Problem-solving skills are enhanced through camp classes, living in a group environment and participating in group activities. Planning skills are addressed as youth work with teen and adult volunteers to develop activities, prepare team challenges and plan their day.

Results
Post camp surveys indicate that campers ages 9-13 report increasing their independence as a result of attending 4-H camp. Youth attending 4-H camp reported increases in independence skills. Specifically, 72% of survey respondents reported that camp taught them to take care of themselves, 70% indicated that they needed less help from adults after camp and almost 70% learned to make good decisions at camp even when their family was not around to help them. When asked what they enjoyed most about camp youth stated: "you get to get away from home and you learn," "mostly the respect and independence," "being dependent on myself," and "that they taught me when I put my head to something I can do it."

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #10

1. Outcome Measures

Number of youth reporting positive attitude change and/or aspirations related to volunteering and community service.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	350	519

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Virginia's urban and rural localities, over 320 gangs with more than 5,000 youth are known to exist. One way to keep youth out of gangs is to offer alternative, positive experiences that appeal to their needs--including service learning opportunities. Youth who participate in civic engagement and community service have improved performance in school (study habits, homework completion, grades), enhanced social skills (teamwork skills, health, safety, and well-being), and positive educational aspirations.

What has been done
In an effort to provide Virginia's youth with meaningful experiences with caring adult mentors that result in community and societal benefits, a wide variety of service learning/community service activities were offered to youth of various backgrounds.

Results
More than 500 Virginia 4-H youth participated in service learning/community service facilitated by Extension 4-H Agents. In one unit, over 100 youth participated in 356 hours of community service. When asked, 90% of youth reported positive attitude change related to volunteering for civic activities, community service, and/or philanthropy. All youth reported gaining knowledge and/or skills related to the relationship they had with a caring adult. In addition, 95% of youth indicated an improved attitude and/or aspirations toward participating in partnerships with caring adults.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #11

1. Outcome Measures

Number of youth and adults demonstrating an increase in knowledge and/or skills in animal sciences.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	1000	10644

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to research the average age of Virginia producers is nearing retirement age at 56.7 years old, which means that there is a strong need for younger people to become interested in agriculture. According to Allen and Harris in the article, What We Know About the Demographics of US Farm Operators, from 1992 to 2002 there was a 60% decrease in estimated young farmers. Research has observed that with fewer young people going into agriculture, the long term future of the
agricultural industry is in question.

What has been done
Across the Commonwealth, youth participated in a variety of projects in and out of school. Youth learned about various species of livestock, including how to raise and care for them, how to keep records, and fiscal responsibility. In school youth participated in the embryology and natural resource programs. Fourth grade students engaged in hands on learning during the 4-H Agriculture and Natural Resource Day. After school, students participated in the Animal Science Club, the local horse clubs, or in dairy judging and stockman's teams.

Results
In Virginia there were 10,623 youth participating in animal science related programming. Youth took part in club, county, district, state and national programs in which they began to understand the importance of the animal science programming. In one unit, youth demonstrated an increase in knowledge through an 85% increase in animal science project book completion. Additionally, there was a 95% increase in animal science volunteers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #12

1. Outcome Measures

Number of youth through communication and expressive arts programming 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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	400	21843

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In a survey to all 4th and 5th grade teachers in one county, teachers named oral and written communication skills as one of the top three skills that the students needed to develop. Virginia' Standards of Learning (S.O.L.') for 4th and 5th grade require that all students be taught how to write and organize both speeches and presentations. Respondents emphasized that the 4-H staff continues to teach communication skills to youth enrolled in 4-H and offers opportunities for students to demonstrate skills learned.

What has been done
Educational programs were presented in the areas of parliamentary procedure, public speaking, visual communications, oral presentations using visuals, and written communications. In one unit, over 450 4-H Members participated in 4-H classroom and community presentations and public speaking contests. Of these, over 20 competed at the district level competition.

Results
Students were surveyed at the end of the school year to gather data relating to the impact of the program. 75% of the students felt that they had learned something valuable by learning to give a speech or presentation. More than 50% enjoyed the experience and looked forward to giving speeches in the future. 92% enjoyed listening to their peers and felt that they learned something new from the overall experience.
Teachers responding to the assessment indicated that: more than 95% of students increased their knowledge in each of the communications areas. 80% of students increased their skill level. 50% of students utilized or demonstrated communication behaviors and practices through participation in 4-H activities and in other classroom situations. 75% of students exhibited increased self confidence.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #13

1. Outcome Measures

Number of 4-H youth participating in foods, nutrition, and health programs demonstrating healthy living choices.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	14000	23714

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to the National Institute of Health, the number of overweight children has doubled in the last decade. Currently one out of every five children is overweight in the U.S. and it is being considered an epidemic. Thirty-nine percent of Virginia's children are overweight, well above the national average of 14.8%.

What has been done
Through 4-H's Healthy Lifestyles and Food and Nutrition curriculum, Virginia 4-H addresses the state's childhood obesity problem by including healthy habits and physical activity in 4-H. Specifically, in one unit 1,327 youth ages 7 to 14 participated in the Healthy Weights for Healthy Kids program. This program educates youth about smart nutritional choices by engaging them in six key topic areas: USDA's MyPyramid, portion size and eating in moderation, healthy beverages, healthy snacks, physical activity, and positive body image.

Results
Of the 1,327 youth enrolled in Healthy Lifestyles and Food and Nutrition curriculum in 2009, 100 % indicated they have incorporated at least one new health or nutrition practice (eating correct portion sizes, eating in moderation, choosing healthier beverages over high calorie/high sugar drinks, eating healthier snacks and/or increasing physical activity) into their daily lives. 100 % of youth indicated increased knowledge on the benefits of physical activity, 100% indicated the importance of healthy food options, 100% indicated increased knowledge of diseases related to obesity, and 100% indicated the importance of eating correct portion sizes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #14

1. Outcome Measures

Number of youth participants in 4-H natural resources and environmental education programs demonstrating environmentally responsible behavior

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	4000	29552

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As technology becomes more integrated into everyday life, youth are becoming less active outdoors and spending more time with video games, computers, and cell phones. These youth are thus less knowledgeable of natural resources related information and how it affects their personal lives and the lives of those around them. Research has linked this lack of nature to some of the most disturbing childhood trends, such as the rises in obesity, attention disorders, and depression.

What has been done
The 4-H Natural Resources Weekend, a two-day event offers 36 hands-on workshops primarily conducted in outdoor settings that address topics related to natural resources such as wildlife and fisheries, forestry, water quality, and outdoor recreation. Participants have the opportunity to be active outdoors while learning research-based facts about the environment.

Results
As a result of participation in the State 4-H Natural Resources Weekend, respondents indicated 108 new skills or knowledge learned from participation in the weekend event such as many wildflowers in VA are invasive, non-natives; how to identify wildlife by their skulls, how recycling helps, water quality, winter tree ID; maple syrup process; importance of cohabitation between humans and wildlife; fish anatomy; basics of wildlife mgmt; how to tell the sex of snakes; owl pellets are not poop; and how vegetation determines the quality of the land. Participants described 4-H Natural Resources Weekend as "a very rewarding experience"; "It's really fun and educational"; "the things you learn will stick with you forever";and "terrific way to get your kids back to nature."

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #15

1. Outcome Measures

Number of youth participants studying plant, soils, and entomology who have learned the interconnectedness of organisms and their environment

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	30000	9741

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Thirty-two percent of land in Virginia is used for agricultural purposes, yet a large percentage of our youth have no concept of the responsibility, economics, and science used in producing their own food from a garden.

What has been done
In response to the need for youth to increase agricultural awareness, the 4-H Mini-Garden project provided youth with the curriculum, knowledge and opportunity to grow their very own 10X16 vegetable garden (seeds and plants provided: green beans, tomatoes, bell peppers, cucumbers and yellow squash). Participants kept records of plant growth, fertilization, weeding, and harvest.

Results
In one county, evaluation of progress was taken during two separate garden visits and review of project records submitted by participants. 36 of the 39 participants successfully completed all of the project components: workshop, plant/care/harvest, and project record book. Of the 39 youth participating, 95% correctly lined off their gardens into appropriate planting rows. 92% completed and submitted a project record for competition. And, 100% of those completing project records correctly noted the expenses and income from their garden. A parent commented to judges regarding her son's 4-H Mini-Garden Project, "He has more pride in this garden than any toy or game in our house!"

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #16

1. Outcome Measures

Number of youth demonstrating an increase in knowledge and/or skills in science and technology.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	34000	32922

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 average, expanded opportunities to scaffold and anchor science concepts 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 American youths with a solid background in science, engineering, and technology" (110th Congress: Session 2, September 2008).

What has been done
Working with volunteers and professional collaborators, Virginia 4-H provided SET programming to youth ages 5-19 in the areas of science, engineering and technology through a variety of delivery modes.

Results
Within Virginia 4-H 32,922 youth participated in SET programming. Specifically, in one unit, 751 4-H members participated in focused SET programming during a 2009 summer day camp. Camp participants were surveyed at the completion of the camp for SET knowledge gained. As a result of participating in the SET day camp, 92% of campers rated the camp as Good-Excellent, 92% of youth increased their knowledge in SET, and 64% of youth increased their interest in learning about SET in the future.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #17

1. Outcome Measures

Number of volunteers completing a training program and successfully leading a program, activity, event, or club.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	200	20222

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
An active, effective 4-H program cannot run smoothly without the guidance, vision, knowledge and leadership of adult volunteers. There are 20,222 adult and teen volunteers that donated their valuable time and resources to lead 4-H programming throughout Virginia. It is Virginia Cooperative Extension's and Virginia 4-H's responsibility to provide each of these volunteers with the necessary training, resources, and knowledge to be the best 4-H leader possible.

What has been done
Across the Commonwealth, adult volunteer trainings were held for both new and seasoned 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.

Results
Survey results from one locality conducting three volunteer trainings indicated that volunteers increased their 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 understanding basic 4-H policies and procedures before the training was a 2.5. After the training, the average was a 4.3. The average level of knowledge about guiding principles and essential elements of positive youth development before the training was 3.7. After the training, the average was 4.8. Overall, 94% of participants left the trainings with an increased level of knowledge and preparation to serve as a 4-H adult club leader and advisor.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #18

1. Outcome Measures

Number of youth reporting positive attitude change and/or aspirations about learning and careers in a 4-H project area.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	1000	1639

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
4-H curriculum in many cases have prepared youth for careers in the actual areas for which they have completed 4-H projects. Between the ages of 14-18, Super's Developmental Theory (1970) indicates that youth are "developing and planning a tentative vocational goal." This goes hand-in-hand with decision-making theories in which youth make critical decisions about career choices. It is important prior to and especially at the time when youth are making career interest decisions that they have the appropriate information and experiences.

What has been done
Virginia 4-H in collaboration with the Center for Academic Enrichment and Excellence (CAEE) implemented a Career/College Fair in conjunction with the annual State 4-H Congress in 2008 and 2009. The purpose of the fair was to expose 4-H participants to career and post-secondary education options. Twenty-seven higher education institutions across the Commonwealth and six Virginia Tech departments were represented at the fair. Participants were exposed to a variety of academic programs, as well occupations youth might consider in the future.

Results
Many students who completed the Career Decision Survey indicated that 4-H helped them to learn about different careers. Results also indicated that students in 4-H have learned about careers not only by participating in 4-H, but with activities outside of 4-H. The Career/College fair was helpful to students in determining their possible major and career choice.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #19

1. Outcome Measures

Number of youth indicating increased knowledge/skills related to economic education and/or entrepreneurship.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	700	1695

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Teaching career and entrepreneurship skills to youth is an important step towards guiding them to become independent, self-efficient, and contributing members of society. As the job climate is faced with profound uncertainty, more youth are getting into trouble and not involved positive programs to enhance their job skills. With Virginia losing more and more jobs on a daily basis, youth are feeling there is little hope for them to get jobs in their locality.

What has been done
One unit developed a workforce preparation program for high school seniors during 2009. "Welcome to the Jungle - Don't Monkey Around" took a holistic approach to teaching students about the importance of careers, entrepreneurship, and life skills needed to excel at home, college, and in the workplace including personal financial management, nutrition and health and job interviewing skills. Providing students with instruction and opportunities to develop these skill sets at an early age can prevent costly mistakes or missed opportunities in the future.

Results
Approximately 200 high school seniors participated. Participants were engaged in activities designed to teach skill sets and develop a strong work ethic. Activities included creating a simple budget, learning about employers' expectations, and managing a healthy lifestyle away from home. As a result, 85% of participants found the program beneficial. Students practiced the skills needed to develop a healthy lifestyle through food choices; successfully managing their finances as they develop their independence; find gainful employment; and develop a strong work ethic. Participants and their teachers indicated that the program was an excellent introduction of preparing for the workforce or continuing with post-secondary education in the areas of finance, nutrition & health, home life, and job interview skills.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #20

1. Outcome Measures

Number of youth indicating increased knowledge and/or skills related to leadership.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	2000	7878

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia 4-H Youth Development provides opportunities for youth ages 5-19 to experience positive youth development. Adolescents, in particular need opportunities to participate in programs that provide basic needs through Head (Independence), Heart (Belonging), Hands(Generosity) and Health (Mastery).

What has been done
State 4-H Congress provides opportunities for youth ages 14-19 to practice leadership, citizenship and life skills. 391 youth attended 4-H Congress for four days in 2009 where they participated in educational workshops, group living, competitions, and service learning.

Results
Youth reported learning technical skills, character development, friendship skills, responsibility, self-esteem, time management and life skills. Qualitative results presented below were self-reported by teens in the areas Head, Heart, Hands and Health: Head-Independence:
"being a leader can be hard, but it can also be fun and rewarding" and
character and integrity defines who you are as a person" Heart-Belonging: "that so many people from different backgrounds come together for the same cause" and "that there are tons of different kinds of people we should get to know them without judging" Hands-Generosity: "there are people rooting for me to do a good job" and "being a leader can be hard, but it can also be fun and rewarding" Health-Mastery: "when I come here I wasn't very outgoing and when I'm leaving I have more confidence."

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #21

1. Outcome Measures

Number of youth or parents of youth indicating a postive change in behavior and attitudes as a result of particpating in 4-H Character Counts! activities and programs.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	25000	18115

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Many youth are not learning or using 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 used by youth to handle conflict resolution. Character education for youth can address these issues.

What has been done
The Virginia 4-H Character Counts! (CC!) program, teaches trustworthiness, respect, responsibility, fairness, caring, and citizenship as the six pillars of character. Age-appropriate games, role playing, discussion, reflection, and examples make these character values understandable. Through these efforts each child receives a minimum of 6 hours of CC! programming. And 143 adults across the Commonwealth have been actively engaged in implementing CC! More than 4,300 youth & adults were exposed to CC! through media.

Results
As reported by the graduates of the 2007 and 2008 Statewide Character Counts! training, 1,628 youth self-reported a change in their behavior by refraining from stealing, lying, cheating, using violence to resolve disagreements, or being disrespectful as a result of implementing the program. Eighty-six teachers, leaders, and facilitators who used Character Counts! reported an overall positive difference in the youth who participate in the program as being more trustworthy, respectful, responsible, fair, caring, or a good citizen.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #22

1. Outcome Measures

Percentage of trained volunteers and citizens participating in facilitation skills training indicating increased knowledge, skills, and attitudes 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	Quantitative Target	Actual
2009	60	93

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 in the recent Situational Analysis. Particularly as agencies and groups face economic challenges, reductions in budgets, and staff reductions, it is critically important to be effective at working together to share resources and accomplish tasks.

What has been done
Community Viability specialists researched tools for enhancing facilitation skills and selected the material developed by the University of Maine, Strengthening Your Facilitation Skills. Three Community Viability specialists completed the Train-the-Trainer workshop as part of the National Conference held in Belfast, Maine in 2007. In 2008, Strengthening Your Facilitation Skills (SYFS) was adapted to meet Virginia Cooperative Extension's goals and is now available as a community-based training program.

Results
In June 2009, 14 agents and specialists completed the Strengthening Your Facilitation Skills training with 9 of the 14 certified as Master Trainers. A team of Master Trainers also conducted the training for another 12 agents in Northern Virginia during fall 2009. Results indicated that 93% of survey respondents felt that the Training Series helped them to better understand the process of facilitation. Moreover, 93% of respondents indicated that they will adopt some of the facilitation skills learned in this training.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #23

1. Outcome Measures

Number of local communities partnering with Virginia Cooperative Extension faculty to increase resources to address poverty issues

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	10	33

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
One in ten Virginians lived in poverty in 2008 and more than 26,000 families receive TANF aid each month. Poverty has a significant impact on families. Children, in particular, are more likely to suffer poor nutrition in infancy, leading to poor brain development and academic difficulties. They are also more likely to be obese, experience health problems and emotional distress, have a lower life expectancy, and have an increased chance of academic failure and teenage pregnancy. All of these factors have economic costs to society, as well.

What has been done
Several approaches have been used to partner with communities to increase resources to address poverty issues. First, to raise awareness of the true needs, poverty simulations were held with service providers, elected officials, and other citizens. Secondly, a partnership with Virginia Department of Social Services led to the hosting of a major statewide set of listening sessions called "Virginia Act on Poverty."

Results
There were 11 poverty simulation events held in 8 Virginia communities, with a total of 250 service providers, elected officials, and citizens. Facilitated discussions regarding poverty and resources were held at the conclusion of the sessions. The Act on Poverty was also implemented, which was one of the largest-ever, simultaneous conversations devoted to reducing Virginia's poverty rate and increasing economic opportunity for all. The event was designed to stimulate ideas for local and statewide action. Held simultaneously at 25 community college campuses, the event attracted over 1,100 people who heard a presentation on poverty in Virginia and presented their own recommendations on addressing the challenges of poverty. A report was distributed titled Rethinking Poverty: Poverty in Virginia.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #24

1. Outcome Measures

Number of local communities partnering with Virginia Cooperative Extension faculty to address community food systems issues

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	3	0

3c. Qualitative Outcome or Impact Statement

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

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #25

1. Outcome Measures

Percentage of trained volunteers and citizens participating in food-based business workshops indicating increased understanding/knowledge of food-based businesses 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	Quantitative Target	Actual
2009	60	98

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Today more and more people want to know where their food comes from and they increasingly shop at locally owned food-based businesses or at one of Virginia's 142 farmers markets. Agriculture contributes over $55 billion to the state's economy and since 2005, Virginia has seen a 61 percent increase in established farmers markets.

What has been done
To assist Virginia's food entrepreneurs manage successful small businesses and farmers market managers maintain successful community-based farmers markets, Extension agents and specialists completed two full-day workshops on the technical and non-technical skills needed to sustain profitable food markets. In addition, four short presentations on Virginia Farm Bureau's "Save Our Food" campaign were made at local farmers markets. Three separate presentations described the economic impact of farmers markets, how farmers markets spur entrepreneurship and how local food marketing campaigns create profitable food and agricultural businesses were given to Virginia Main Street community organizers at a statewide conference. Northern District Community Viability also partnered with the Virginia Organic Producers and Consumers Association to host a Food and Farm Expo to showcase local farmers and food entrepreneurs.

Results
In March, April and November 2009, VCE led a collaboration to complete two two-day workshops attracting over 220 individuals on food entrepreneurship and business development for Virginia's local agriculture and value-added food producers. There was another workshop held with an additional 23 participants on how to start a food-based business. End of session evaluation results showed that:
98% of respondents agreed that the training increased their understanding of starting a food-based business
95% felt that the food-based business start-up, product costing/pricing, and writing a business plan session was excellent
74% reported that the Marketing Opportunities for Virginia's Agriculture and Value-Added Food Producers session was excellent

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #26

1. Outcome Measures

Percentage of adult 4-H volunteers participating in leadership and volunteer development trainings indicating increased knowledge, skills, and attitudes 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	Quantitative Target	Actual
2009	70	57

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Volunteers are essential to the success of VCE programming. Current budget climates require faculty to do more with less, making the contribution of 4-H volunteers' vital. Their support is instrumental in fulfilling programmatic objectives for 4-H youth participants (Stedman and Rudd, 2006). Trained volunteers are needed to fill these roles and engage youth in positive youth activities and life skill/decision making, two of the top needs identified in the 2009 VCE Situation Analysis Report.

What has been done
Publicity and recruitment efforts bring volunteers to the Extension Office for a variety of purposes. Through training and other interactions, their strengths are identified. Training helps polish skills as well as to ensure adherence to VCE and 4-H policies. Individual or group trainings are targeted to specific task responsibilities. A resource packet including forms, constitution, bylaws and charter templates, and financial, club and risk management protocols is provided to each club volunteer.

Results
Adult volunteers assisted with the development, delivery and evaluation of Virginia 4-H programs. Volunteers helped as judges for presentation contests, as instructors for after-school enrichment classes or as chaperones for Jr. 4-H camp. In total, Virginia 4-H volunteers donated 418,597 hours of volunteer time which allowed programming to reach 150,026 youth through safe, high quality 4-H programs. Specifically, in one unit, nine 4-H clubs were successfully ran by trained adult volunteers. One adult volunteer was certified as a 4-H rifle instructor and one took the horse measurer's certification. Volunteers within in this unit continue to attend quarterly council meetings where they receive on-going training by the agent.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #27

1. Outcome Measures

Percent of parenting education participants increasing knowledge of using available community resources to meet their needs.

Not Reporting on this Outcome Measure

Outcome #28

1. Outcome Measures

Percentage of early childhood professional development participants increasing knowledge of appropriate health, safety and nutrition practices

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	97

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There 599,000 children under the age of 6 in Virginia, 62% of whom are routinely cared for by someone other than their parents. One in five Virginia children enters kindergarten without the basic skills needed to succeed. Yet research shows that the first five years of life are crucial to children's long term cognitive, social and emotional development. Additionally, every dollar that is invested in high quality childcare and early childhood education returns $7 to $8 to society by reducing cost related to crime, special education and welfare and increasing revenues through improved employee productivity.

What has been done
VCE conducted early childhood educator trainings across the state. Workshops on a variety of topics related to high quality early childhood education were provided, including safety and emergency preparedness, working with parents, strategies for working with children with developmental delays, recognizing and reporting abuse and neglect, adult-child interactions, infant and toddler development, age-appropriate learning activities for science, art, and school-age children.

Results
Results from one training, with 175 participants who provide care for 2,977 children, yielded the following results:
100% of respondents learned new ideas for how to introduce new foods to children to increase the variety in their diets
97% of respondents learned important food safety procedures when doing food activities with children
97% of respondents learned about the MyPyramid for Preschoolers guidelines for proper nutrition

4. Associated Knowledge Areas

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

Outcome #29

1. Outcome Measures

Percentage of early childhood professional development participants adopting appropriate health, safety and nutrition practices.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	40	82

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There 599,000 children under the age of 6 in Virginia, 62% of whom are routinely cared for by someone other than their parents. One in five Virginia children enters kindergarten without the basic skills needed to succeed. Yet research shows that the first five years of life are crucial to children's long term cognitive, social and emotional development. Additionally, every dollar that is invested in high quality childcare and early childhood education returns $7 to $8 to society by reducing cost related to crime, special education and welfare and increasing revenues through improved employee productivity.

What has been done
VCE conducted early childhood educator trainings across the state. Workshops on a variety of topics related to high quality early childhood education were provided, including safety and emergency preparedness, working with parents, strategies for working with children with developmental delays, recognizing and reporting abuse and neglect, adult-child interactions, infant and toddler development, age-appropriate learning activities for science, art, and school-age children.

Results
Results of one training with 152 participants who provide care to an estimated 978 children per year indicated that:
90% of respondents learned new healthy food choices for children and new activities to increase children's physical activity
Based on three to six month follow up evaluations conducted with program participants:
82% increased the number of healthy meals and/or snacks they served to children

4. Associated Knowledge Areas

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

Outcome #30

1. Outcome Measures

Percentage of early childhood professional development participants increasing knowledge of basic child development

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	96

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There 599,000 children under the age of 6 in Virginia, 62% of whom are routinely cared for by someone other than their parents. One in five Virginia children enters kindergarten without the basic skills needed to succeed. Yet research shows that the first five years of life are crucial to children's long term cognitive, social and emotional development. Additionally, every dollar that is invested in high quality childcare and early childhood education returns $7 to $8 to society by reducing cost related to crime, special education and welfare and increasing revenues through improved employee productivity.

What has been done
VCE conducted early childhood educator trainings across the state. Workshops on a variety of topics related to high quality early childhood education were provided, including safety and emergency preparedness, working with parents, strategies for working with children with developmental delays, recognizing and reporting abuse and neglect, adult-child interactions, infant and toddler development, age-appropriate learning activities for science, art, and school-age children.

Results
At one of the trainings, with 137 participants attending:
96% of the respondents said they had a better understanding of the stages of child development

4. Associated Knowledge Areas

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

Outcome #31

1. Outcome Measures

Percentage of early childhood professional development participants adopting developmentally-appropriate practices

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There 599,000 children under the age of 6 in Virginia, 62% of whom are routinely cared for by someone other than their parents. One in five Virginia children enters kindergarten without the basic skills needed to succeed. Yet research shows that the first five years of life are crucial to children's long term cognitive, social and emotional development. Additionally, every dollar that is invested in high quality childcare and early childhood education returns $7 to $8 to society by reducing cost related to crime, special education and welfare and increasing revenues through improved employee productivity

What has been done
VCE conducted early childhood educator trainings across the state. Workshops on a variety of topics related to high quality early childhood education were provided, including safety and emergency preparedness, working with parents, strategies for working with children with developmental delays, recognizing and reporting abuse and neglect, adult-child interactions, infant and toddler development, age-appropriate learning activities for science, art, and school-age children.

Results
At the largest training where there were 369 early childhood educators, a six-month follow-up survey was conducted with a random selection of 38% of the participants. Results indicated that 100 percent of those respondents indicated making a change in the learning environment based on information gained at the trainings. On average, participants made 2.7 improvements per person, indicating that the training is effective in helping early childhood educators implement new ideas and strategies to improve the quality of early childhood care and education provided to children in Virginia.

4. Associated Knowledge Areas

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

Outcome #32

1. Outcome Measures

Percentage of early childhood professional development participants increasing knowledge of appropriate child observation and assessment

Not Reporting on this Outcome Measure

Outcome #33

1. Outcome Measures

Percentage of early childhood professional development participants increasing knowledge of the components of an effective learning environment

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	98

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There 599,000 children under the age of 6 in Virginia, 62% of whom are routinely cared for by someone other than their parents. One in five Virginia children enters kindergarten without the basic skills needed to succeed. Yet research shows that the first five years of life are crucial to children's long term cognitive, social and emotional development. Additionally, every dollar that is invested in high quality childcare and early childhood education returns $7 to $8 to society by reducing cost related to crime, special education and welfare and increasing revenues through improved employee productivity.

What has been done
VCE conducted early childhood educator trainings across the state. Workshops on a variety of topics related to high quality early childhood education were provided, including safety and emergency preparedness, working with parents, strategies for working with children with developmental delays, recognizing and reporting abuse and neglect, adult-child interactions, infant and toddler development, age-appropriate learning activities for science, art, and school-age children.

Results
One training, held with 175 early childhood educators yielded the following results:

98% of participants increased knowledge about age-appropriate behavior expectations and strategies that contribute to a positive learning environment.

98% of respondents indicated that they learned how to adapt learning activities for children with developmental delays

98% of respondents indicated that they learned how to adapt learning materials for children with developmental delays

4. Associated Knowledge Areas

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

Outcome #34

1. Outcome Measures

Percentage of early childhood professional development participants increasing knowledge of effective interaction strategies.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	60	88

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There 599,000 children under the age of 6 in Virginia, 62% of whom are routinely cared for by someone other than their parents. One in five Virginia children enters kindergarten without the basic skills needed to succeed. Yet research shows that the first five years of life are crucial to children's long term cognitive, social and emotional development. Additionally, every dollar that is invested in high quality childcare and early childhood education returns $7 to $8 to society by reducing cost related to crime, special education and welfare and increasing revenues through improved employee productivity.

What has been done
VCE conducted early childhood educator trainings across the state. Workshops on a variety of topics related to high quality early childhood education were provided, including safety and emergency preparedness, working with parents, strategies for working with children with developmental delays, recognizing and reporting abuse and neglect, adult-child interactions, infant and toddler development, age-appropriate learning activities for science, art, and school-age children.

Results
Results of one training with 152 participants who provide care to an estimated 978 children per year indicated that:
88% of respondents learned new ideas to help children get along with others (social skills)
Based on three to six month follow up evaluations conducted with program participants:
95 % implemented a new strategy to improve relationships with the families of the children in their care

4. Associated Knowledge Areas

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

Outcome #35

1. **Outcome Measures**

Percentage of early childhood professional development participants implementing at least one strategy to improve program management practices.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

In 2009 there were vacancies in 4-H and Family and Consumer Sciences agent and specialist positions that were not filled. Some of those positions are still in the search process and others have been subject to a statewide hiring freeze due to local and state budget constraints. These vacancies impeded meeting some of the outputs and outcomes in this planned program for 2009. Indirect youth contacts are lower than planned due to reductions in postage and printing budgets. It should also be noted that there were limited opportunities for professional development, as budget cuts have not allowed for statewide trainings. This has precluded a number of agents, particularly newer 4-H agents, to receive valuable curriculum-specific and other programmatic trainings.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)

Evaluation Results

In 2009, post-distal program evaluation questionnaires were delivered to 119 adult Innovative Leadership: Building Community Connections participants from 2008 or 2009 (both completers and non-completers) with 23% (n=27) response rate. Of the program completers who returned the questionnaire, 46% reported an appointment to a decision-making group within the community, 69% reported an increase in community engagement after completing the program indicating that they were more visible in the community, attending meetings of the governing body, monitoring county legislation, serving on community watch groups, and engaging in other community activities, 57% reported an increase in networking with community leaders, and 69% believed their participation in Innovative Leadership provided them the ability to lead more effectively.

Gloucester County 4-H worked with teachers and community education coordinators in six elementary

schools to provide monthly science- based programs for grades 4 and 5. The program used integrated evaluation methods (eg. students were evaluated on their changed knowledge and behaviors as part of the lesson). Conversion to 4-H club format for the fourth grade facilitated evaluation with students holding mini-focus groups to determine, "How can we apply what we learned?" section of the club report. Formative evaluation, achieved through dialogue with teachers, observation, and show of hands methods, allowed adjustments to improve curriculum delivery to youth with multiple learning styles. This program reached over 1,000 students monthly in 2008-09, and 95% of the students demonstrated program related competencies in science. Teachers increasingly trust Extension's effectiveness in reaching youth through hands-on learning. One teacher said "You are here because the 4-H enrichment program is not a cut into my instructional time. 4-H does what I don't have time or money to do&mdashyou show them how it works in the real world. That means everything."

The Middle Peninsula Junior 4-H Camp implemented a simple-to-administer daily file card evaluation. Campers and teen counselors answered three open-ended questions: "Describe one thing that you learned; What did you enjoy most?; What could have made today better?" Camp goals included teaching life skills and increasing subject specific knowledge. Agents summarized data daily by cabin and gender. Agents recorded observations and unsolicited feedback from campers, teens, adults and staff. The 4-H Center surveyed a random sample of campers and conducted a post-camp survey of adults and teen volunteers. Twice-daily meetings with camp staff, directors, adults and agents gave additional feedback. Daily data from 183 responders identified: Most important 4-H life skills learned were respect, teamwork, responsibility and caring; 65% increased subject-based knowledge; 98% enjoyed camp classes and songs; 50% recommended no changes. Areas for improvement were: 25% wanted increased unstructured/pool time; 10% wanted changes to food and facilities. Agents, staff and administration observed strong teamwork and leadership among teens.

Key Items of Evaluation

See items above

V(A). Planned Program (Summary)

Program # 7

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
501	New and Improved Food Processing Technologies	10%	10%	10%	10%
502	New and Improved Food Products	10%	10%	10%	10%
702	Requirements and Function of Nutrients and Other Food Components	20%	20%	20%	20%
703	Nutrition Education and Behavior	20%	20%	20%	20%
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	15%	15%	15%	15%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	15%	15%	15%	15%
724	Healthy Lifestyle	10%	10%	10%	10%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	40.0	2.0	23.0	3.0
Actual	43.2	3.0	32.2	2.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
1093718	174245	601976	615196
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1417909	13754	2018063	427919
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
2416618	111282	5913335	100000

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct educational classes, workshops, short courses, meetings, supermarket and facility tours, seminars, and trainings for consumer and professional groups; develop curriculum, newsletters, and other educational resources; establish and implement train-the-trainer models to promote educational opportunities for consumers; 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 consumers through journal articles, papers, reports, and public media; develop and implement marketing strategies using various outlets to promote program participation, with special attention to underserved and disadvantaged audiences; disseminate research-based information to consumers and address emerging needs using a variety of media and innovative technology resources; cooperate with media and other community agencies to seek effective means of targeting new and non-traditional audiences; and respond to consumer inquiries.

2. Brief description of the target audience

Childhood Obesity, Nutrition and Fitness: young children (ages 2 - 5 years); school-age children; adolescents; parents; caregivers (family, in-home, and for-profit day care); school faculty of young children, youth, and adolescents; school food service workers and managers ;health care providers and Extension educators.

Adult Nutrition and Prevention of Chronic Disease: young adults (ages 25 to 59); older adults (age 60 and older); caregivers of older adults; adults with type 2 diabetes and their families, parents, and caregivers; senior center and meal site staff and volunteers; worksite wellness programs; and Extension educators.

Food Safety: retail and food service employees; retail and food service managers; temporary food vendors; child care providers; school food service employees and managers; children of all ages; young adults (ages 25-59); older adults (ages 60 and older); Extension educators; and commercial food processors.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	191900	160600	101600	85000
Actual	117311	71666	149128	9659

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

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	5	10	
Actual	61	55	116

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Food Safety - 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	Target	Actual
2009	1000	672

Output #2

Output Measure

- Adult Nutrition and Chronic Disease Prevention - Number of adults participating in diabetes educational programs.

Year	Target	Actual
2009	95	1184

Output #3

Output Measure

- Childhood Nutrition & Fitness - Number of pre-school aged youth participating in Food Friends and Mighty Moves program and other Extension educational programs at childcare centers or schools

Year	Target	Actual
2009	250	3140

Output #4

Output Measure

- Childhood Nutrition and Fitness - Number of elementary and middle school-aged youth participating in the Virginia Cooperative Extension Healthy Weights for Healthy Kids program or other nutrition education programs for youth

Year	Target	Actual
2009	11500	41533

Output #5

Output Measure

- Childhood Nutrition and Fitness - Number of adolescents participating in Virginia Cooperative Extension nutrition education programs

Year	Target	Actual
2009	300	1279

Output #6

Output Measure

- Childhood Nutrition and Fitness - Number of youth participating in Virginia Cooperative Extension school-based wellness initiatives or efforts to address local school wellness policies aimed at improving available foods and physical activity opportunities
  Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Adult Nutrition and Chronic Disease Prevention - Number of adults participating in at least one session on adult nutrition, fitness, or health

Year	Target	Actual
2009	2600	15720

Output #8

Output Measure

- Food Safety - 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	Target	Actual
2009	4	5

Output #9

Output Measure

- Food Safety - Number of shortcourses 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	Target	Actual
2009	5	14

Output #10

Output Measure

- Number of home food preservation trainings offered by Extension educators in Virginia

Year	Target	Actual
2009	3	49

Output #11

Output Measure

- Number of consumers completing safe food handling and preparation classes for civic/community groups and volunteer fund raisers supplying food for large groups of people.

Year	Target	Actual
2009	220	397

Output #12

Output Measure

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

Year	Target	Actual
2009	10	17

Output #13

Output Measure

- Chronic Disease: Number of research papers published on obesity and related chronic disease.

Year	Target	Actual
2009	5	46

Output #14

Output Measure

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

Year	Target	Actual
2009	5	5

Output #15

Output Measure

- Childhood Nutrition and Fitness - Number of Headstart and preschool teachers and day care providers receiving training for delivering food, nutrition, and fitness-related education to preschool children and their parents.

Year	Target	Actual
2009	{No Data Entered}	1250

Output #16

Output Measure

- Childhood Nutrition and Fitness - Number of elementary and secondary school teachers, school nurses, and school food service managers receiving training in child nutrition, health, and fitness for program implementation in their schools.

Year	Target	Actual
2009	{No Data Entered}	499

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Childhood Nutrition and Fitness - Number of select elementary or middle school-aged youth who gain knowledge and awareness of nutrition, physical activity, and positive body image and improve at least one program-related behavior after participation in Virginia Cooperative Extension nutrition education programs
2	Childhood Nutrition and Fitness - Number of pre-school aged youth participating in Extension educational programs at childcare centers who try more new foods, consume more fruits, vegetables, or wider variety of foods, or increase physical activities after participation in the program
3	Adult Nutrition and Chronic Disease Prevention - Number of individuals with diabetes who have lowered their Hemoglobin A1c level by at least 0.5, three months after participating in a diabetes education program offered in cooperation with a local health care provider
4	Adult Nutrition and Chronic Disease Prevention - Number of adults participating in at least one class on adult nutrition, fitness, or health who indicate their intent to make one change in their dietary intake, food purchasing behavior, or level of physical activity
5	Food Safety - Number of managers, supervisors, and food handling personnel from restaurants, public school and hospital cafeterias, daycare centers, nursing homes, university foodservice, correctional centers, and other foodservice industries who increase knowledge and skills in safe food handling practices by 30%
6	Food Safety - Number of Virginia food producers and processors to implement (pre and post harvest) HACCP, quality assurance programs and processing technology that will provide for increased food safety and processing efficiency
7	Food Safety - Number of home-based business entrepreneurs who are provided with assistance and training who increase awareness and knowledge in producing safe high acid and acidified foods
8	Food Safety - Number of consumers and at-risk populations, including civic/community groups, senior citizens, child care providers, youth, 4-H youth, Master Food Preservers, and volunteer cooks at fund-raising events, who increase their knowledge of foodborne illness, safe food handling practices, and food preservation
9	Childhood Nutrition and Fitness - Number of adolescents or high school students who improve their diet and physical activity after participation in Virginia Cooperative Extension nutrition education programs
10	Childhood Nutrition and Fitness - Number of children who report eating healthier foods and being more physically active as a result of Virginia Cooperative Extension school-based wellness initiatives or efforts to address local school wellness policies to improve available foods and physical activity opportunities
11	Adult Nutrition and Chronic Disease Prevention - Number of adults participating in VCE adult nutrition, physical activity, or health programs who report at least one positive change in their dietary intake (i.e., increase their servings of fruits, vegetables, whole grains, or low-fat/non-fat dairy/dairy alternative products or decrease their servings of sweets or saturated fats)
12	Adult Nutrition and Chronic Disease Prevention - Number of adults participating in VCE adult nutrition, physical activity or health programs who report increased physical activity (i.e. walking, strength training, using fewer labor-saving devices, incorporating more activity into daily living)
13	Adult Nutrition and Chronic Disease Prevention - Number of adults participating VCE adult nutrition, physical activity, or health programs who report at least one positive change in their food purchasing behavior (i.e., reading labels, using unit pricing to stretch food dollars, purchasing whole grains versus enriched grains, choosing products lower in sodium)
14	Healthy Families - Number of individuals who increase: the meals they prepare at home; the availability of fruits, vegetables, whole grains, milk or water; physical activity; or who reduce television viewing during meals, as a result of family-centered VCE programs.
15	Studying the value-adding components and properties of pomace from Virginia grown fruit and vegetables

Outcome #1

1. Outcome Measures

Childhood Nutrition and Fitness - Number of select elementary or middle school-aged youth who gain knowledge and awareness of nutrition, physical activity, and positive body image and improve at least one program-related behavior after participation in Virginia Cooperative Extension nutrition education programs

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	187	34390

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Over the past 30 years the number of overweight children and teens has nearly tripled with the result that one in three children in the U.S. between the ages of 6 and 19 is overweight or obese. This problem, reaching epidemic proportions, presents a major public health challenge to parents, schools, and health care professionals. Overweight in children has both physical and emotional consequences. Overweight children are more likely to have high blood pressure and high blood cholesterol, conditions previously associated with middle age adults. The growing numbers of children with type 2 diabetes have been attributed to overweight, and overweight children are likely to continue to be overweight as adults. For the first time in history many children will die at younger ages than their parents. Large children also report lower self-esteem, sadness, feelings of isolation, and an overall lower quality of life than healthy weight children. Overweight is also costly adding to long term health care expenditures.

What has been done
Proper nutrition, regular physical activity, and positive body image have been shown to be critical for children to achieve healthy weights and physical and emotional health. Healthy Weights for Healthy Kids (HWHK) was developed by Virginia Cooperative Extension as a collaborative effort between the Family and Consumer Sciences and 4-H programs. Based on the Experiential Learning Model and driven by key topics related to preventing overweight, the curriculum contains six lessons for youth ages 7 to 14: Smart Foods (MyPyramid); Smart Choices (portion sizes); Smart Snacks (healthy snacks); Smart Drinks (healthy drink options); Smart Activities (physical activity); and Smart Image (positive self-esteem and body image). Since its development over 10,000 youth have completed HWHK in a variety of settings including school, after school, and at summer camps. This year exposure to the program was expanded by offering training on this curriculum to over 350 teachers, over 120 school food service manages, and 23 school nurses.

Results

Based on pre- and post-program questionnaires, children participating in HWHK made changes in their food choices and increased their physical activity. 74% reported drinking more milk and less soda, 80% are eating more vegetables, and 84% are choosing more nutrient dense snacks. Physical activity increased in 94% of the children participating in the assessment. individual interviews supported these findings. Comments included, "This program is helping us kids make healthier bodies," and "I am trying to help my body." Several children noted that eating food with more nutrients helped them think and concentrate better. Continuing education workshops informed teachers of the ability of the HWHK curriculum to meet the Virginia Standards of Learning and led to its expanded use in the physical education curriculum in elementary and middle schools.

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 pre-school aged youth participating in Extension educational programs at childcare centers who try more new foods, consume more fruits, vegetables, or wider variety of foods, or increase physical activities after participation in the program

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	187	6034

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Nearly 14% of preschool children are overweight and rates are higher in the southern region and among limited resource audiences. Overweight in early childhood adds to the risk of adult obesity and the premature development of chronic disease. Good nutrition and physical activity help young children establish healthy lifestyles that prevent childhood overweight. But only 36% of 2- to 3-year olds were found to have a "good" diet. Childhood overweight also bears an economic cost as health care for an overweight child averages $72 more per year than for a child with a healthy weight.

What has been done

Because many children spend much of their day in childcare centers, these centers have an important role in promoting healthful eating and regular physical activity. For limited resource children, Head Start centers are an alternative to childcare. Through partnerships with Colorado State University and the Virginia Department of Social Services FCS implemented teacher training and made available curriculum materials suitable for pre-school children that promoted literacy, skill building, good food habits, and increased physical activity. Newsletters reinforcing lesson content were sent home to parents to encourage healthy eating at home. Child care workers were also provided with nutrition and food service information for planning menus and snacks to support healthy eating.

Results
More than 1250 preschool teachers, reaching more than 8000 children participated in training programs provided by FCS. Teachers reported that children were more active, more willing to try new foods, and ate more fruits and vegetables. In various locations grocery stores and farmers' markets provided "tours" for the children and donations allowed each child to select a piece of fruit for a snack. Parents liked the information provided and indicated they became more aware of their shopping habits and were more likely to read food labels. Parents also commented that their children began talking about the foods they ate at day care, causing parents to buy different foods at the grocery store. One teacher noted that incorporating the I Am Moving, I am Learning curriculum will greatly improve student's classroom success. An unexpected finding was the effect of the lessons on the behavior of teachers. Teachers began to be more active and ate more fruits and vegetables after teaching these lessons to the children.

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

Adult Nutrition and Chronic Disease Prevention - Number of individuals with diabetes who have lowered their Hemoglobin A1c level by at least 0.5, three months after participating in a diabetes education program offered in cooperation with a local health care provider

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	50	19

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Diabetes is the 6th leading cause of death in Virginia. Over 400,000 Virginians have been diagnosed with diabetes and another 132,000 Virginians have diabetes and don't know it. Diabetes has a high cost in money, loss of productivity, and quality of life. Diabetes also contributes to other chronic or disabling conditions including heart disease, blindness, kidney failure, and amputations of the lower extremities. In Virginia diabetes leads to 11,700 hospitalizations each year at a cost of nearly $173 million. The burden of diabetes is disproportionate to African Americans, individuals with limited incomes, the elderly, and those residing in rural and underserved locations with limited access to health care.

What has been done

FCS partnered with the Virginia Department of Health Diabetes Prevention and Control Division and local health care professionals including public health nurses and registered dietitians from local hospitals and health care facilities to offer Dining with Diabetes (DwD). This program consists of four weekly classes with a reunion class three months following, allowing for outcome assessment and follow-up. Programs were offered at five locations across Virginia -Brunswick, Lunenburg, Kilmarnock, Russell, and Petersburg (two series were offered in Petersburg based on the volume of requests). DwD helps persons with diabetes and their families learn how to better manage their disease with education on self care, appropriate food choices, and activity patterns that will prevent or slow the development of diabetes complications.

Results

Overall, more than half of DwD participants providing data were African American, and in all cases minority enrollment met or exceeded the census statistics for that county. One-third of all participants were over the age of 70 and nearly half had annual incomes falling below $30,000. Forty percent of those providing data had annual incomes falling below $15,000. Upon completion of the program over 90% of participants recognized the need for an annual eye exam, an annual foot exam, and a hemoglobin A1c test 3 to 4 times per year as recommended by the U.S. Center for Disease Control and Prevention. Clinical evaluation included hemoglobin A1c, an indicator of average blood sugar levels over the two months prior, and class members were helped to understand the importance of this test. Although fewer than expected were able to lower their hemoglobin A1c levels by 0.5% or more, statewide 39% of all participants demonstrated improved diabetes management based on reductions in their A1c levels and over one-third of these moved from a level above 7 into the desirable A1c range of 7 or below. Fifty one percent of all participants maintained good diabetes management over the course of the program. Research published in the Journal of the American Medical Association found that people with even small decreases in their hemoglobin A1c required fewer physician visits in the years following with an estimated annual savings of $685 per year.

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

Adult Nutrition and Chronic Disease Prevention - Number of adults participating in at least one class on adult nutrition, fitness, or health who indicate their intent to make one change in their dietary intake, food purchasing behavior, or level of physical activity

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	1900	6857

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Chronic diseases including heart disease, stroke, cancer, and diabetes lower the quality of life and if unchecked lead to disability, loss of independence, and death. Cardiovascular disease including heart disease and stroke, cancer, and diabetes account for more than 60% of deaths in Virginia. Moreover, these conditions drive health care spending. Hospitalizations for cardiovascular disease lead to annual costs of $3.6 billion, and if reduced by 5% would produce a 5-year saving of $900 million. Chronic disease increases in both prevalence and severity with advancing age, with the result that persons over age 60 make up about 13% of the population but incur over one-third of all health care costs. Containment of health care costs will require the adoption of healthy lifestyles that address risk factors such as elevated blood pressure, elevated blood cholesterol and lipid levels, and overweight or obesity. A diet low to moderate in fat and saturated fat and meeting MyPyramid guidelines for fruits, vegetables and grains, along with 30 to 60 minutes of physical activity on most days of the week helps prevent the development of chronic disease. Individuals who eat at least 5 servings of fruits and vegetables a day can cut their risk of cancer by half. Unfortunately, many Virginians fail to meet both dietary and activity guidelines. 74% of adults consume less than the recommended 5 servings of fruits and vegetables a day and 23% are sedentary (reporting no leisure physical activity). Other risk factors common among Virginians are excessive body fat (61% of Virginians are either overweight or obese), high blood pressure (27%) and elevated blood lipids (36%). Risk of both chronic disease and earlier death is higher among African American and disadvantaged populations.

What has been done
FCS agents have promoted healthy lifestyles with various age groups in many different settings. Young women have been reached with nutrition education through the Family Nutrition Program and many of these participants have children who also benefit from their mothers' new knowledge and practice. Head Start and child care settings have been sites for family nights in which parents attend with their children and taste new foods. Classes held at worksites during lunch hours or after the shift has been completed have enabled agents to reach both men and women of different ages. Church wellness programs have been an effective means of reaching both young families and older adults in a setting in which they feel comfortable. Senior centers and meal programs have been a popular site for the Active Aging series developed for older adults.

Results
Evaluations of adult programs focusing on healthy lifestyles indicate that the majority of participants (75% to 96% depending on location and audience) intended to make at least one behavior change to lessen their risk of chronic disease. Among those completing follow-up questionnaires, most noted that they had improved their diet in at least one of the following ways: ate more fruits and vegetables; ate more whole grains; ate more calcium-containing foods; ate fewer sweets; or ate less fat or substituted healthier fats for saturated fats. Intended changes in food purchasing behavior included purchasing less processed varieties of food or using food labels when selecting food. Intent or implementation of greater physical activity was generally lower (in one group only

21% actually increased their physical activity) than changes in food intake. However, in low income minority audiences, many participants made positive changes in food intake, physical activity, and food purchasing behavior. For those living in environments that lack safe areas for walking, increasing physical activity may be a more difficult action to complete as compared to a dietary change.

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 #5

1. Outcome Measures

Food Safety - Number of managers, supervisors, and food handling personnel from restaurants, public school and hospital cafeterias, daycare centers, nursing homes, university foodservice, correctional centers, and other foodservice industries who increase knowledge and skills in safe food handling practices by 30%

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	800	580

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Centers for Disease Control and Prevention estimates that annually, 76 million people in the US become sick with foodborne illnesses: 325,000 are hospitalized, and 5,000 die. Foodborne illnesses are typically caused by improperly-prepared food. People who become sick are prone to be less productive in both their professional and home lives. The Food and Drug Administration estimates the economic cost of foodborne illness in terms of pain and suffering, reduced productivity, and medical expenses to be between $10 billion and $83 billion dollars per year. This equates to an estimated cost of approximately $131 to $1,092 per foodborne illness case.

What has been done
ServSafe(tm) is a nationally recognized certification program that teaches safe food handling practices and helps prevent foodborne illness outbreaks. In Virginia, ServSafe(tm) is conducted by Virginia Cooperative Extension (VCE) and targets employees in food-service establishments. In 2009, fifteen family and consumer science agents conducted the ServSafe(tm) program throughout Virginia.

Results
During 2009, 672 food service employees became certified in ServSafe(tm) through VCE across Virginia. 371 restaurants, schools, daycare centers, and prisons sent employees to the program. Of those who completed

feedback forms, 72% of ServSafe(tm) respondents increased their knowledge of food safety practices by at least 30%. 109 participants responded to a three to six-month follow-up survey, for a response rate of 15%. Of respondents, 99% adopted at least one new food safety practice. Of those who adopted a new food safety practice: 87% improved time and temperature practices, 90% made changes to prevent food contamination; and 71% made changes to personal hygiene practices. As a result of the ServSafe(tm) program across the state, $88,421.76 to $727,177.92 were potentially saved from pain and suffering, reduced productivity and medical expenses if one case of foodborne illness was prevented per food handler completing the course.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Food Safety - Number of Virginia food producers and processors to implement (pre and post harvest) HACCP, quality assurance programs and processing technology that will provide for increased food safety and processing efficiency

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	100	204

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
A number of food related outbreaks have occurred as a result of poor management practices both on the farm and within food production facilities, bringing to light the need for training designed for food producers and those individuals who are responsible for regulating the food industry.

What has been done
Training was developed and delivered to the VA and NC peanut processing industry. The workshop included training on the control of Salmonella in low-moisture foods and the application of Hazard Analysis Critical Control Point (HACCP) principles to ensure the safety of their products. Good Agricultural Practices was developed to teach on-farm management practices that improve the safety of fresh fruits and vegetables. GAPs training in the areas of pre-plant, harvest, post-harvest, transportation, worker hygiene, and record-keeping was performed in workshop format

Results
35 VA and NC peanut processors participated in 16 hours of training in food safety management techniques. Based on post-workshop survey responses the participants found the workshop to be beneficial in their efforts to improve the safety of their products.100% of respondents answered "yes" to the following question: "As a result of attending the Peanut Food Safety Workshop will you make changes to existing food safety plans or develop new

food safety plans for your peanut products?"The seafood industry in Virginia has one of the highest successful compliance rates with FDA seafood HACCP regulations. Both industry and regulatory personnel receive the same training resulting in better communication between the industry and regulators. This year 94 fresh fruit and vegetable producers in Virginia were trained in the principles of GAPs through workshops. As a result, these producers are beginning the process of implementing changes to their management of the produce production environment.

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 #7

1. Outcome Measures

Food Safety - Number of home-based business entrepreneurs who are provided with assistance and training who increase awareness and knowledge in producing safe high acid and acidified foods

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	150	187

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Food processors in Virginia need guidance on formulation and regulation of their products in order to produce safe and wholesome food products that are in compliance with state and federal laws.

What has been done
Food products and processes are analyzed and recommendations for formulation and processing are delivered. Since we are recognized as a Process Authority for acidified foods, food processors who receive guidance through this program are able to file required processing documents with the Food and Drug Administration (FDA).

Results
Two hundred twenty-seven products were analyzed, submitted by 67 clients. In cooperation with NCSU and UGA, the program director helped develop new criteria, submitted and accepted by the FDA, for the evaluation of acidified foods. There was a total direct cost savings to Virginia food companies of $92,395.This calculation does not include over 1500 phone calls and emails fielded by this office to individual Virginia residents, VCE agents, VDACS agents and VDH agents. If each client prevents just one foodborne illness (using Salmonella as a low-cost basis), then the savings is $120,186 annually. Therefore, a conservative estimate of the value of this program to Virginia is approximately $313,211 annually.

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 #8

1. Outcome Measures

Food Safety - Number of consumers and at-risk populations, including civic/community groups, senior citizens, child care providers, youth, 4-H youth, Master Food Preservers, and volunteer cooks at fund-raising events, who increase their knowledge of foodborne illness, safe food handling practices, and food preservation

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	200	203

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Centers for Disease Control and Prevention estimates that annually, 76 million people in the US become sick with foodborne illnesses: 325,000 are hospitalized, and 5,000 die. Foodborne illnesses are typically caused by improperly-prepared food. People who become sick are prone to be less productive in both their professional and home lives. The Food and Drug Administration estimates the economic cost of foodborne illness in terms of pain and suffering, reduced productivity, and medical expenses to be between $10 billion and $83 billion dollars per year. This equates to an estimated cost of approximately $131 to $1,092 per foodborne illness case.

What has been done
In Virginia, a four hour food safety program conducted by Virginia Cooperative Extension (VCE) targets individuals that occasionally prepare and serve large quantities of food for the public through fundraisers or church events. In 2009, ten family and consumer sciences agents conducted this program throughout Virginia. There were a total of 18 classes held for 397 participants.

Results
203 different church, civic groups and public service organizations participated in the program. Of those who completed pre and post evaluations, 373 increased their knowledge of food safety practices. 113 participants responded to a follow-up survey, for a response rate of 28%. Of respondents, 91%adopted at least one new food safety practice. Of those who adopted a new food safety practice: 84% improved time and temperature practices; 80% made changes to prevent food contamination; 79% made changes to personal hygiene practices. As a result of the four hour food safety program taught throughout Virginia, $52,237.26 to $433,567 were potentially saved from pain and suffering, reduced productivity and medical expenses if one case of foodborne illness was prevented per food handler completing the course.

4. Associated Knowledge Areas

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

Outcome #9

1. **Outcome Measures**

Childhood Nutrition and Fitness - Number of adolescents or high school students who improve their diet and physical activity after participation in Virginia Cooperative Extension nutrition education programs

Not Reporting on this Outcome Measure

Outcome #10

1. **Outcome Measures**

Childhood Nutrition and Fitness - Number of children who report eating healthier foods and being more physically active as a result of Virginia Cooperative Extension school-based wellness initiatives or efforts to address local school wellness policies to improve available foods and physical activity opportunities

Not Reporting on this Outcome Measure

Outcome #11

1. **Outcome Measures**

Adult Nutrition and Chronic Disease Prevention - Number of adults participating in VCE adult nutrition, physical activity, or health programs who report at least one positive change in their dietary intake (i.e., increase their servings of fruits, vegetables, whole grains, or low-fat/non-fat dairy/dairy alternative products or decrease their servings of sweets or saturated fats)

2. **Associated Institution Types**

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	1200	830

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Chronic diseases such as heart disease, stroke, cancer, and diabetes are among the most prevalent, costly, and preventable of all health problems. Seven of ten deaths each year in the U.S. are attributed to chronic disease. The prolonged illness and disability associated with these diseases also decreases the quality of life for millions of Americans and in Virginia alone, cardiovascular disease and diabetes account for over $4 billion in health care costs. Much of this burden is preventable, since unhealthy eating and physical inactivity are major contributors to

these diseases and associated risk factors such as high blood pressure, high cholesterol, and overweight.

What has been done
The FIT Extension program was implemented by 14 agents across the state as part of an integrated research-extension initiative. Fit Extension is an eight-week behavior change program that was designed using evidence-based group dynamics principles to promote physical activity and fruit and vegetable consumption.

Results
1091 adults participated in FIT Extension and 76%(830)of participants (982) increased their fruit and vegetable consumption over the course of the 8 week program.

4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

Adult Nutrition and Chronic Disease Prevention - Number of adults participating in VCE adult nutrition, physical activity or health programs who report increased physical activity (i.e. walking, strength training, using fewer labor-saving devices, incorporating more activity into daily living)

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	1200	982

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Regular physical activity and healthy eating habits are important factors contributing to quality of life and prevention of chronic disease. However, most Americans are insufficiently active and do not consume enough fruits and vegetables. In Virginia, over 50% of adults do not meet the current public health recommendations for physical activity, and over 70% of adults not meeting the current dietary guidelines for fruit and vegetable consumption (FVC).

What has been done
The FIT Extension program was implemented by 14 agents across the state as part of an integrated research-extension initiative. Fit Extension is an eight-week behavior change program that was designed using evidence-based group dynamics principles to promote physical activity and fruit and vegetable consumption.

Results
1091 adults participated in FIT Extension and 90% of participants (982) increased their time spent in physical activity over the course of the program.

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

Adult Nutrition and Chronic Disease Prevention - Number of adults participating VCE adult nutrition, physical activity, or health programs who report at least one positive change in their food purchasing behavior (i.e., reading labels, using unit pricing to stretch food dollars, purchasing whole grains versus enriched grains, choosing products lower in sodium)

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	1200	5366

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The average U.S. supermarket offers nearly 47,000 different items from which consumers may choose. 57% of shoppers indicate they are making a lot of effort to eat better but over half indicated the need more practical tips to help them. Food labels provide information to enable consumers to compare the relative healthfulness of similar food products, but still leave the average consumer with many questions. The majority of people over age 55 are trying to limit their sodium intake, but find it difficult to determine from the Nutrition Label how much they should have, and the contribution of that food serving to their overall intake for the day. Convenience is a major factor in food selection for a busy homemaker but the relative cost of a preprepared item versus a home prepared item is an important consideration, especially when food resources are limited. Use of label information such as "best used by," shelf signs giving cost per ounce, and notes as to appropriate storage and handling can enable consumers to make the best possible use of their food dollar.

What has been done
Lessons with active learning have been developed for use with limited resource families, enabling them to make better use of their food dollars and maximize the nutrition received from food stamps. Grocery store tours serve as a hands-on laboratory to apply shopping concepts. Classes held at farmers' markets have enabled consumers to evaluate the relative cost and benefits of locally-grown fresh produce.

Results

Outcomes of core lessons for low income homemakers on planning meals, preparing a grocery list, comparing prices, and stretching the food dollar over the week or month were as follows: 76% to 81% improved their food resource management practices and 49% to 56% began using food labels to compare the cost and nutritional value of processed foods. 100% of the older adults participating in a Save Money on Food class presented at senior centers intended to make at least one change in their food shopping behavior.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
724	Healthy Lifestyle

Outcome #14

1. Outcome Measures

Healthy Families - Number of individuals who increase: the meals they prepare at home; the availability of fruits, vegetables, whole grains, milk or water; physical activity; or who reduce television viewing during meals, as a result of family-centered VCE programs.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	30	320

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As activities offered by schools and communities continue to grow in number, family meals with parents and children become more difficult to manage. Eating together as a family has implications for both nutritional and emotional wellbeing. Meals eaten as a family often have higher nutritional value than when family members each make something for themselves or make a meal on snacks. Children eating more meals with their parents have higher intakes of calcium-rich foods, fruits, and vegetables. Parents also serve as role models, encouraging children to try new foods. Family meals also contribute to family connectedness, and youth eating more meals with their parents do better in school, are less likely to use tobacco, alcohol, and drugs, and are more resistant to developing eating disorders. Meals at home also build habits that carry over into succeeding years when children are grown and living on their own.

What has been done
Suppers Made Simple (SMS) is a curriculum developed by FCS agents to encourage family meals. Recipes and menus representing nutritious and easy to prepare meals are provided along with content on the importance of

family meals to family well-being. It is intended that parents/grandparents and children attend together. Classes are usually scheduled in the late afternoon so that families can prepare their evening meal and eat together in a social environment. SMS was offered in several locations and sponsored by Head Start and day care centers, schools and parent-teachers associations and community centers.

Results
A series of school family nights that enabled children and parents to cook and eat a meal together enrolled 360 families. Follow-up indicated that 50% of the children in these families had better diets with increased intakes of fruits and vegetables, more milk, and fewer sweets after completion of the program. Parents reported reading labels to select better foods and eating more meals at home. A program for ethnically diverse immigrant families introduced them to new recipes and healthy foods available in the supermarket that had been unfamiliar to them. All of the families reported making at least one of the new recipes at home. An after-school program teaching children to prepare simple but healthy recipes sponsored a family dinner in which children invited their parents and siblings to taste the foods they had learned to make.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #15

1. Outcome Measures

Studying the value-adding components and properties of pomace from Virginia grown fruit and vegetables

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia tobacco production has been steadily declining over the last few years such that the current production level is almost identical to that of the years following the end of the Civil War. In order to maintain local agrarian based economies in Virginia, it is imperative to investigate alternative crops that are profitable for the farmers. Vegetable soybean, tomato and grape are major crops grown in Virginia that have the potential to replace tobacco. This study investigates waste byproducts of processing, called pomace, for value-adding and health beneficial components including vitamins, carotenoids, phenolic antioxidants, phytosterols, and essential fatty acids including the omega-3 linolenic acid (18:3n-3).

What has been done

Pomace from grape, apple, and tomato, and soybean seeds and pods grown in Virginia were collected from local producers and analyzed for value-adding components and properties. The components included seed content, fat content, fatty acid composition, and individual phenolic acids. The properties included antioxidant activities such as the oxygen radical absorbance capacity (ORAC) assay, neutral DPPH radical scavenging activity, ABTS positive radical scavenging activity, and total phenolic content (TPC). Extracts of the pomace and soybean samples were further evaluated for antiproliferation effects against 3 human cancer cell lines including HT-29 and Caco-2 colon cancer cells and Hep-G2 liver cancer cells. Water, 50% acetone, and 80 % acetone extracts of chardonnay grape pomace were also evaluated for ORAC, DPPH, ABTS, and TPC and antiproliferation effects against HT-29 cells.

Results

The current study found that the fatty acid composition of the grape, apple, and tomato pomace was similar to previous studies of respective oil and flour extracts. Grape pomace extract had the highest antioxidant activities in all tests including ORAC, DPPH, ABTS, and TPC followed by the apple pomace and tomato pomace. Antiproliferation effects against human HT-29 and Caco-2 colon cancer cells and human Hep-G2 liver cancer cells were significant and correlated to antioxidant activities. Grape pomace extract had the strongest antiproliferation effects followed by apple pomace and tomato pomace. The results from this study suggest possible food applications for grape pomace in health promotion and disease prevention through improving human nutrition.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
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.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Loss of personnel)

Brief Explanation

Forty-six FCS agents provided programming in 2009 as compared to 51 in 2008; this represents a 10% loss available professional time.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Before-After (before and after program)
- During (during program)

Evaluation Results

The Dining with Diabetes (DwD) program consisting of four weekly classes and a follow-up class 2 to 3 months following is designed to help people with diabetes and their families learn to better manage the nutritional aspects of their disease. Classes are taught cooperatively by FCS agents and a local health care professional, with the FCS agent preparing healthy recipes for tasting and helping with practical aspects of healthy cooking and the health care professional providing assistance with carbohydrate control and overall diabetes management. Questionnaires relating to food habits, activity patterns, menu planning for diabetes, and self-care were administered at the first class and the reunion class. Clinical evaluation included measurements of blood pressure and hemoglobin A1c, an indicator of average blood sugar levels and overall diabetes management over the three months prior. 184 persons participated in the evaluation (informed consent followed the guidelines of the Institutional Review Board for the Protection of Human Subjects of Virginia Tech). Upon completion of the program over 90% of participants recognized the need for an annual eye exam, an annual foot exam, and a hemoglobin A1c test 3 to 4 times per year as recommended by the U.S. Center for Disease Control and Prevention. Based on responses obtained at the first class and the reunion class 65% of participants increased the number of days in the week they used a meal planning method to control their carbohydrate intake and 73% increased the number of days in the week they had at least 30 minutes of physical activity. Statewide, 39% of all participants demonstrated improved diabetes management based on reductions in their hemoglobin A1c levels and over one-third of these moved into the desirable A1c range. Fifty one percent of all participants maintained their good diabetes management over the course of the program. . Research published in the Journal of the American Medical Association found that people with even small decreases in their hemoglobin A1c required fewer physician visits in the years following with an estimated annual savings of $685 per year.

Key Items of Evaluation

Collaborative community programs bringing together the strengths of Family and Consumer Sciences and local health professionals can successfully assist persons with diabetes and their families with appropriate management of their disease. 39% of participants in the Virginia program lowered their hemoglobin A1c and potentially reduced their annual health care costs. Over half of participants were able to maintain their appropriate hemoglobin A1c levels.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Natural Resources and Environment

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

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	25.0	0.5	25.5	1.0
Actual	26.4	0.5	22.6	1.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
667567	63361	422120	177783
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
865443	53561	1415112	404009
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1694587	82000	4146565	15888

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, mill owners and workers, private consultants and companies, local governmental officials, waste water treatment operators, state and federal agencies, nongovernmental organizations, professional associations and societies, and community groups.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	62600	191800	18000	55300
Actual	77728	131847	44283	4194

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

Patent Applications Submitted

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	7	15	
Actual	5	66	71

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational programs offered

Year	Target	Actual
2009	900	911

Output #2

Output Measure

- Number of educational materials and curriculas developed

Year	Target	Actual
2009	20	24

Output #3

Output Measure

- Number of applied research projects

Year	Target	Actual
2009	70	125

Output #4

Output Measure

- Acres of land exposed to educational programming efforts.

Year	Target	Actual
2009	100000	338000

Output #5

Output Measure

- Identifiable impacts reported by agents/specialists

Year	Target	Actual
2009	40	198

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of individuals with increased knowledge of best management practices in wildlife management, forestry, and other potential soil and water impacting land management industries.
2	Number of communities and industries with increased knowledge of best management practices in wildlife management, forestry and other potential soil and water impacting land management industries.
3	Number of individuals adopting at least one improved management practice toward achieving sustainability in wildlife management, forestry and other potential soil and water impacting land management industries.
4	Number of communities and industries adopting at least one improved management practice toward achieving sustainability in wildlife management, forestry and other potential soil and water impacting land management industries
5	Number of mills reporting increased profitability, improved safety indicators, or improved efficiency.
6	Number of forest, or disturbed land acres with improved management practices.
7	300 Virginia well owners participating in one of six county based household drinking water clinics will increase their knowledge and understanding about potential threats to the quality of their drinking water.
8	Clinic participants will learn about the quality of their private water supply by submitting a sample that will be analyzed for a suite of potential contaminants.
9	Number of certified nutrient management planners trained.
10	Number of acres covered by nutrient management plans.
11	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.
12	Number of acres with enhanced management systems as a result of certified land applicator training.
13	Studying the soil and water quality impact assessment of antibiotics

Outcome #1

1. Outcome Measures

Number of individuals with increased knowledge of best management practices in wildlife management, forestry, and other potential soil and water impacting land management industries.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	500	11456

3c. Qualitative Outcome or Impact Statement

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

What has been done
The varied backgrounds of small acre owners require the use of innovative and sophisticated communication methods to convey the benefits and responsibilities of owning forests. A publication entitled The Woods in Your Backyard (2006) serves as a manual and workbook targeting small acreage owners. Workshops for landowners and trained volunteers were initiated in 2007. Since then, 10 two-part workshops have been delivered in Extension's Northern District. The participatory workshops require homework completion toward plan development. The aim is to equip small acreage landowners with a management planning tool and knowledge to implement practices.

Results
Of the 252 participants, who averaged seven acres each, 70% plan to complete a written plan. According to exit evaluations, 92% intend to better manage natural areas and 53% plan to convert excessive lawn to natural areas. Over 90% described in follow-up survey at least one action they plan to take in the next two months. Within two months, all participants began the planning processes and 10% completed a written plan for their property. Many contacted a local natural resource professional. Additional unsolicited feedback shows a change in attitude and action to result in more natural area. One participant said, "We have begun many of the improvements. It is a particular pleasure for us to replace non-native plants with native species and we have been actively removing invasive species."

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
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
403	Waste Disposal, Recycling, and Reuse

Outcome #2

1. Outcome Measures

Number of communities and industries with increased knowledge of best management practices in wildlife management, forestry and other potential soil and water impacting land management industries.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	100	250

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Numerous studies quantify the contribution of trees to economic, social and ecological health in urban areas. Trees are a critical component of the green infrastructure of a developed community in providing clean air, water and livable communities. However, Northern Virginia has lost 35% of its urban forest in the last 20 years to development.

Municipal foresters cite a myriad of challenges to effectively manage urban forest resources. Barriers often stem from the inability to enact local ordinances to address local issues. Additionally, many municipal leaders and decision makers are ill-informed of basic urban forest tenets, resulting in policies and procedures at odds with environmental and economic goals. Thirdly, the lack of an urban forestry network has resulted in inefficient approaches by individual municipalities for issues common to the region. For example, an issue identified by stakeholders is the traditional conflict between the building and development community and those with urban forestry interests resulting in practices at odds with public interests.

What has been done

The Northern Virginia Urban Forestry Roundtable was formed in 2006 with the support of state & local governments, related businesses and interested citizens to explore and address issues related to urban forestry. The group holds round-table meetings on a quarterly basis with ad-hoc committee work as needed. The roundtable also plans and delivers a conference every other year to address a specific issue. This year's conference was "Community Forests Grow Community Benefits" to explore the value of the economic and ecologic value of the region's forest with a focus on perceptions and interactions underserved ethnic groups have with urban forest resources. Over 230 different individuals have participated in one or more roundtable function with an average of 40 individuals representing all facets of urban forestry participate in any given quarterly meeting. These are organized and run by an executive committee and local host entity.

Results

New partnerships and knowledge gain have developed to affect positive change. A sub-committee representing municipal urban forestry and the development community cooperated to modify earlier bills with language supported by both interests. This historical partnership resulted in the passage of enabling legislation adding tree conservation language to the code of Virginia. (SB 710 and HB1437 added a new section to existing § 15.2-961) This allows jurisdictions located in Planning District 8 in non-attainment for 8-hour ozone standards to shift the focus of their local tree canopy ordinance from tree replacement to tree preservation, a more effective and efficient approach. Additionally, roundtable participants worked together to have trees included as a voluntary measure in the State's Implementation Plan to meet air quality goals. This year's conference participants indicated an increase in knowledge, one participant shared, "I have a better understanding of how to approach different ethnic groups and that a citizen champion can help bridge the gap between government and the community." The roundtable network has been credited with facilitating regional cooperation and idea sharing between municipalities as well as improving the knowledge of decision makers in Northern Virginia about the value and management of the region's urban forests. Another conference and previous roundtable participant cites an important function the roundtable has served, "I am particularly pleased with the Roundtable practice of establishing an atmosphere that allows representatives from 'both sides' to discuss their points of view. I think this is possibly the most valuable offering of this organization."

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
104	Protect Soil from Harmful Effects of Natural Elements
123	Management and Sustainability of Forest Resources
124	Urban Forestry
131	Alternative Uses of Land
403	Waste Disposal, Recycling, and Reuse

Outcome #3

1. Outcome Measures

Number of individuals adopting at least one improved management practice toward achieving sustainability in wildlife management, forestry and other potential soil and water impacting land management industries.

2. Associated Institution Types

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	250	756

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia Cooperative Extension delivered five events that instructed forest landowners on topics such as managing degraded woodlands, managing for timber production and wildlife habitat concurrently, and managing small woodlots. The events also introduced the Forest Stewardship Program and the Tree Farm Program, both of which link landowners to professional foresters who assist landowners with long-term management.

What has been done
Two of the events were delivered in conjunction with the Virginia Forest Landowner Education Program. Two others were developed locally with input from Virginia Tech College of Natural Resources faculty. The fifth was based on the regional Extension publication, The Woods in your Backyard. All of the events encouraged stewardship of forestland and provided landowners with tools and knowledge to get started in woods management or strengthen their existing efforts at tending their woods.

Results
As a result of the forest landowner events conducted during 2009, at least eighteen landowners have worked with Virginia Department of Forestry personnel to develop Forest Stewardship Plans for their property, a critical step in forest conservation. Additional landowners have enrolled in the Tree Farm Program, which is also based on developing a land management plan.

Based on survey responses, ninety-four percent of targeted small woodlot owners plan to manage the natural areas that they own better. Across multiple areas of instruction, landowners exhibited a knowledge gain of 3.9 on a scale of one to five, with five being the highest level of gain. Eighty-three percent of all landowners surveyed plan to implement some of the practices they learned at the events.

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
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
403	Waste Disposal, Recycling, and Reuse

Outcome #4

1. Outcome Measures

Number of communities and industries adopting at least one improved management practice toward achieving sustainability in wildlife management, forestry and other potential soil and water impacting land management industries

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	30	85

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Residents and leaders in the County and Town of Culpeper, through the Extension Leadership Council, requested Virginia Cooperative Extension assistance to improve the professionalism and practices of tree workers in the area. Culpeper County hosts a concentration of tree workers without certification or formal training. The impact on trees and the tree owners from uncertified tree workers may be negative from the sale of unneeded services and the use of practices that hinders tree health. Furthermore, profitable tree work is very competitive. Tree workers with indicators of professionalism, such as certification, are generally more profitable (Haggerty 2006).

What has been done
The "Tree Workers Field-day" was launched to build rapport with tree workers in the Culpeper area. Tree workers participate free of charge in a low-key half day educational event that includes demonstrations on proper tree care, safe working methods, and review of certification options. Field-day success resulted in offering in-depth Certified Tree Worker Training and testing. Since 2005, 102 different individuals have participated in the field day.

Results
As a result of participation in tree worker field-days and certification trainings, seven tree workers earned the "certified tree worker" status. To achieve this, they demonstrated successful safety practices such as: CPR, First Aid and, Aerial Rescue skills in addition to demonstrating a basic competency in tree id, tree biology, pruning and more. As these skills are applied, injury rates are expected to decrease and proper tree care practices are expected to increase ultimately having a positive effect on the health of the Northern Virginia's community forests as well as the reputation and profitability of tree workers in the region.

4. Associated Knowledge Areas

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

131	Alternative Uses of Land
403	Waste Disposal, Recycling, and Reuse

Outcome #5

1. Outcome Measures

Number of mills reporting increased profitability, improved safety indicators, or improved efficiency.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	10	17

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The value of Virginia's forests and forest industry was recently estimated to be $27.5 billion annually. According to the U.S. Bureau of Labor Statistics, logging is one of the most hazardous occupations in the nation. Many Virginia forest products companies require logging contractors to complete Sustainable Harvesting and Resource Professional (SHARP) logger training as a condition of a wood supply business relationship. To date over 3000 individuals have completed the SHARP Logger program, representing the vast majority of logging businesses in the state.

What has been done
The Virginia SHARP Logger Program provides training in sustainable forestry, workplace safety, and environmental protection. In order to become a SHARP Logger, participants must attend a three-part core program which includes classes on sustainable forestry, logging safety, and harvest planning and BMP's for water quality. After becoming a SHARP logger, participants must complete an additional 12 hours of Continuing Education (CE) every three years to maintain their SHARP Logger status. Since 1996 over 3,000 individuals completed the core program representing the majority of wood produced in the state. In 2009, the core program was offered in 4 locations and 41 continuing education classes were offered. In total SHARP logger received over 6000 hours of training in 2009. Logging safety related classes offered by the SHARP logger program include logging safety awareness workshops, as well as an in-woods chainsaw safety class which addresses safety issues related to manually felling trees with a chainsaw, which is one the most hazardous duties in the logging occupation.

Results
A recent comprehensive survey of all current SHARP Loggers found that 70 percent of logging business owners reported that they have made changes to their operations as a result of attending SHARP Logger trainings. Of those indicating they had made changes on their operations, the most commonly reported changes were improvements to the safety of their operation.

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 #6

1. Outcome Measures

Number of forest, or disturbed land acres with improved management practices.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	50000	400000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Eastern Shore of Virginia is home to most of Virginia vegetable production; which is a high value product. Vegetable production systems primarily use conventional tillage and have historically left the land barren over winter unless a wheat crop was part of the rotation. Many vegetable crop production systems include soluble fertilizers that are an overall small percentage of the production budget. Concerns with nutrient and soil losses to the Chesapeake Bay and tributaries are of paramount concern to vegetable and crop farmers, watermen, and the community as a whole.

What has been done
Virginia Cooperative Extension and Virginia Tech personnel have worked aggressively with vegetable producers to implement cover crop best management practices in their production systems. Extension publications, presentations, newsletters, and farm visits were conducted that focused on implementation of best management practices that relate to the reduction of soil and nutrient runoff into the Chesapeake Bay and tributaries.

Results
Through the Eastern Shore Soil and Water Conservation District, over $450,000 was utilized to offer assistance for planting cover crops in Northampton and Accomack Counties. Large scale tomato operators participated in the cover crop cost share program and had a goal for 100% acreage participation. While 100% of tomato growers participated, a usually wet fall did not allow all cover crops to be planted by the deadlines. All growers' still utilized best management practices by working the land prior to cover crop planting in shifts, meaning that some land was never worked and still contained plant residue that protected the soil over the windy and wet winter months. It is difficult to quantify, but visual observations indicate that cover crops and plant residue fields had significantly less wind and water erosion over the 2009 winter compared to cultivated fields. Most fields receiving Ag Stewardship Complaints and complaints to the Eastern Shore Soil and Water Conservation District did not have best

management practices in place; which suggests a positive response to the aggressive education effort of Virginia Cooperative Extension and Virginia Tech.

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
131	Alternative Uses of Land
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife

Outcome #7

1. Outcome Measures

300 Virginia well owners participating in one of six county based household drinking water clinics will increase their knowledge and understanding about potential threats to the quality of their drinking water.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	300	525

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Central Virginia residents rely on private wells or springs as their primary source of drinking water. Although these wells are tested during the installation process, most citizens do not subsequently test their well water unless recommended by a plumber or physician to identify a problem. A primary reason for this lack of testing is the prohibitive cost associated with utilizing private water testing laboratories.

What has been done
Private Well Water Drinking Clinics were conducted in Appomattox, Campbell, Amherst and Bedford (PD11) Counties during 2009. Clinics were conducted on May 18 and May 19 in Appomattox and Campbell Counties respectively. Samples for these two counties were subsequently collected on May 20 and delivered to the Biological Systems Engineering Department at Virginia Tech. The Amherst and Bedford County clinics were conducted on June 1 and June 2 respectively with sample collection and delivery on June 3. Results were provided to the Appomattox and Campbell County participants on June 16, while Bedford participants received results on July 7 and Amherst participants received results on July 14. These clinics offered participants the ability to have 14 different quality components (iron, manganese, hardness, sulfate, chloride, fluoride, total dissolved

solids, pH, langier saturation index, copper, sodium, nitrate, coliform bacteria and E. coli bacteria) of their water tested at a price of $46 per sample. Similar tests at a private laboratory would cost approximately $150.

Results
A total of 114 samples were submitted from the four-county area. Appomattox, Campbell, Amherst and Bedford citizens supplied 25, 5, 50, and 34 samples respectively. Coliform bacteria were identified in 63 percent of the samples and E. coli bacteria were identified in 6 percent of the samples. The presence of E. coli bacteria in one participant's water sample explained stomach illness of visiting relatives. Approximately 12 percent of the participants indicated they planned to shock chlorinate their wells to reduce and/or eliminate the bacterial contamination identified. Low water pH (<6.5) leading to possible corrosion of plumbing components was identified in 37 percent of the samples. 10.5 percent of the samples exceeded the EPA safety standard for nitrate. 12 percent of the samples exceeded the EPA safety standard for manganese. 19 percent of the participants indicated they planned to seek additional water testing from a private laboratory or information about their water quality after participating in this program. 15 percent of the participants indicated they would determine the source of their identified problem, 7 percent indicated they would pump out their septic systems and 6 percent indicated they would reduce herbicide and pesticide use around their well or spring.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
133	Pollution Prevention and Mitigation

Outcome #8

1. Outcome Measures

Clinic participants will learn about the quality of their private water supply by submitting a sample that will be analyzed for a suite of potential contaminants.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	100	244

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There is a great deal of information available to homeowners, landowners and farmers regarding the proper utilization of their water resources. However there is also a great deal of confusion on the part of this group as to how to be sure their water resources are being utilized in the most efficient, healthful and environmentally responsible way. Commercial water quality companies and organizations often take advantage of the ignorance of homeowners and landowners and make excessive profits to remediate problems that can be dealt with by these clients relatively easily and economically with sound recommendations from an objective source. Farmers often do not have the latest information on new developments in water conserving environmentally responsible cropping practices. This can cause problems with water quality in specific cropping areas, and the entire watershed.

What has been done

A series of programs was conducted in calendar year 2009 to inform homeowners, landowners and farmers on the latest information to help them assess their water resources and how to best utilize them. The first program was a Homeowner Well Water Testing program held in Caroline and King George Counties in January. The second program was a No-Till Vegetable Production Program held in June, and the final program was a Pond Management Seminar held in July 2009. No-till vegetable field research plots were established at Mt. Olympus Farm.

Results

172 Homeowners, landowners and farmers were educated in best management practices to contribute to water quality improvement through improved well water management (58-Caroline, 69-King George), no-till cropping systems (8-Hanover, 2-Westmoreland, 3-Spotsylvania, 3-King George, 2-Stafford, 15-Caroline), and surface water impoundment management (8-Caroline, 2-Hanover, 3-King George).

Well owners were educated in collecting, submitting and interpreting drinking water tests (a water quality BMP). 130 wells were tested through the VA Tech Environmental Engineering Well water testing program at a savings to clients of $154/well for the same tests at a private laboratory (total savings:$20,020). In Caroline three wells that tested positive for possible health problems from E. Coli bacteria were identified and remediated through on site treatment. Sixteen other wells that were vulnerable to problems from nitrates, sulfur, acid water or standard coliform were identified and fitted with water treatment systems. Excess nitrates were largely due to proximity to agricultural cropping systems.

Thirty-two farmers and staff involved with soil conservation programs were educated in no-till vegetable production. No-tillage production is a high priority agricultural BMP. Two farmers were recruited to host no-till vegetable production demonstrations, five farmers were signed on by NRCS to implement no-till vegetable production techniques. No-till farming techniques directly impact and reduce the deposition of excess nutrients such as nitrates and phosphates into surface and ground water resources. This is the source of the nitrates found in the well testing program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
133	Pollution Prevention and Mitigation

Outcome #9

1. Outcome Measures

Number of certified nutrient management planners trained.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	25	43

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia currently has nutrient management standards and criteria and a corresponding Nutrient Management Planner certification program developed and administered by the Virginia Department of Conservation and Recreation (DCR). The criteria and planners only addressed agronomic land use. Recently, federal and state water quality management guidelines have become stricter creating a demand for plans that address turf and landscape land use.

What has been done
The partnership between DCR and Virginia Tech was expanded to develop resources in the form of personnel, training, and publications to support the demand for planners with more urban land use experience. Two statewide training sessions (June and September/October) were conducted in Richmond to certify planners in this new area. A 12 chapter state/regional training manual to support the certification process was developed. It is currently under review to become an Extension publication.

Results
Certified 43 people as State of Virginia Nutrient Management Planners specializing in Turf and Landscape sites.

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 #10

1. Outcome Measures

Number of acres covered by nutrient management plans.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	10000	619

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Agricultural nutrient management planning is conducted at the farm level, yet regional and temporal patterns of nutrient surpluses can affect how farmers are able to manage nutrient surpluses and how policies can be targeted to achieve optimal water quality results.

What has been done
The Mid-Atlantic Water Program, using available public data, has developed county-level input and output estimates for nitrogen and phosphorus availability and use on cropland for 1987-2007. A website was developed and published to provide access to tables and maps, plus explanation of nutrient management issues.

Results
The web site is accessed by state, regional, and national users. Inquiries on methods and estimates have been answered from the Chesapeake Bay Program, which is thus considering developing its own estimates broken down by watershed, by Virginia and Maryland state governments, and by multiple private agencies within the watershed. Education received through site access helps users better understand how agricultural nutrient surpluses change across time and geography, and potentially to better manage such surpluses.

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 #11

1. Outcome Measures

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	Quantitative Target	Actual
2009	100	900

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.

What has been done
We conducted composting and compost use educational programs to increase the amount of waste being composted and compost being used to enhance the environment.

We organized a transdisciplinary workgroup consisting of members from extension, state and federal agencies and the private sector to develop a coordinated effort to enlist farmers to compost food and other wastes to prevent landfill disposal and provide a feedstock for a value-added product (compost) for farmers. We organized brainstorming meetings, field days and visits to individual farms. We trained master gardeners, urban nutrient management planners and other educators about the properties and use of compost for turfgrass and landscapes in order to increase the purchase/use and production of compost.

Results
Farmers who had been composting and several that had not previously composted began receiving food and other waste sources that would otherwise have been landfilled for including in their composting operations. Master gardeners, urban nutrient management planners and other educators learned about the benefits of compost and how to incorporate its use in nutrient management plans and expressed a desire to promote its use in turf and landscapes.

4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

Number of acres with enhanced management systems as a result of certified land applicator training.

Not Reporting on this Outcome Measure

Outcome #13

1. Outcome Measures

Studying the soil and water quality impact assessment of antibiotics

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Manures from confined animal operations and biosolids from municipal treatment plants are being used as supplemental fertilizers for crop production. Many types of antibiotics are used for therapeutic and veterinary purposes. However, the body only absorbs a finite amount of these chemicals, thus most are eliminated along with body waste. Water bodies that receive water treatment plant effluents from urban areas and those that receive runoff from confined animal operations can contain some levels of different antibiotics. Runoffs from agricultural fields that receive manure as supplemental fertilizers can also contribute to the antibiotic level in water bodies. Presently, there is limited information on the fate of different antibiotics in the environment.

What has been done
A factorial design was used for the experiment consisting of four antibiotics (amoxyciline, oxy-tetracycline, tetracycline, and tylosin), three extraction solvents (acetonitrile, ethyl acetate, and water), four soils (Bojac, Cullen, Bourne, and Levy), and three replications.

Results
Results obtained show that adsorption of antibiotics varied with soil and solvent type. Even though all antibiotics were soluble in water, extraction of antibiotics with water was a slow process. Photolysis at varied UV levels resulted in some breakdown of parent compounds. The rate of decomposition of antibiotics by soil organisms was highest in the initial week and decreased thereafter. This study shows that the combination of UV light from the sun, soil microbial activity, and certain physical and mineralogical properties of soils could ameliorate the environmental impact of antibiotics.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)

- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

The value of Virginia's forests and forest industry was recently estimated to be $27.5 billion annually. According to the U.S. Bureau of Labor Statistics, logging is one of the most hazardous occupations in the nation. Many Virginia forest products companies require logging contractors to complete Sustainable Harvesting and Resource Professional (SHARP) logger training as a condition of a wood supply business relationship. To date over 3000 individuals have completed the SHARP Logger program, representing the vast majority of logging businesses in the state.

Response: The Virginia SHARP Logger Program provides training in sustainable forestry, workplace safety, and environmental protection. In order to become a SHARP Logger, participants must attend a three-part core program which includes classes on sustainable forestry, logging safety, and harvest planning and BMP's for water quality. After becoming a SHARP logger, participants must complete an additional 12 hours of Continuing Education (CE) every three years to maintain their SHARP Logger status. Since 1996 over 3,000 individuals completed the core program representing the majority of wood produced in the state. In 2009, the core program was offered in 4 locations and 41 continuing education classes were offered. In total SHARP logger received over 6000 hours of training in 2009. Logging safety related classes offered by the SHARP logger program include logging safety awareness workshops, as well as an in-woods chainsaw safety class which addresses safety issues related to manually felling trees with a chainsaw, which is one the most hazardous duties in the logging occupation.

Results: A recent comprehensive survey of all current SHARP Loggers found that 70 percent of logging business owners reported that they have made changes to their operations as a result of attending SHARP Logger trainings. Of those indicating they had made changes on their operations, the most commonly reported changes were improvements to the safety of their operation.

When asked to describe the specific changes made to their operations, written responses included statements such as the following:

"Have changed the way we fell trees on the job"
"Started wearing hard hat and safety glasses"
"Bought chaps and started wearing ppe when using chainsaw"
"Got workers comp. insurance"

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

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	5%	0%	0%	0%
211	Insects, Mites, and Other Arthropods Affecting Plants	10%	0%	25%	50%
212	Pathogens and Nematodes Affecting Plants	10%	0%	20%	0%
213	Weeds Affecting Plants	10%	0%	10%	0%
216	Integrated Pest Management Systems	20%	100%	30%	50%
403	Waste Disposal, Recycling, and Reuse	10%	0%	0%	0%
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	10%	0%	0%	0%
721	Insects and Other Pests Affecting Humans	10%	0%	15%	0%
723	Hazards to Human Health and Safety	10%	0%	0%	0%
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	5%	0%	0%	0%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	30.0	0.0	14.0	1.5
Actual	32.5	1.0	27.9	1.5

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
823704	0	520849	283998
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1067861	0	1746091	404009
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
2090933	22000	5116402	15888

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, Asian soybean rust/soybean aphid website, 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.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	62600	116800	1300	2300
Actual	73372	82869	3120	271

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

Patent Applications Submitted

Year: 2009
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan	10	20	
Actual	13	46	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of outreach citations incorporating information on the most effective IPM strategies and systems for use on selected commodities and/or at selected sites

Year	Target	Actual
2009	125	369

Output #2

Output Measure

- Number of private applicators trained for certification

Year	Target	Actual
2009	750	800

Output #3

Output Measure

- Number of commercial applicators trained for certification

Year	Target	Actual
2009	750	902

Output #4

Output Measure

- Number of private applicators trained for recertification

Year	Target	Actual
2009	2000	3135

Output #5

Output Measure

- Number of commercial applicators trained for recertification

Year	Target	Actual
2009	1000	1518

Output #6

Output Measure

- Number of non-certified applicators trained

Year	Target	Actual
2009	2000	7106

Output #7

Output Measure

- Number of stakeholders enrolled in the IPM Stakeholder Network

Year	Target	Actual
2009	100	350

Output #8

Output Measure

- Number of trainers and regulatory officials trained

Year	Target	Actual
2009	300	846

Output #9

Output Measure

- Educational media website hits communicated through the Pesticide Safety Education website

Year	Target	Actual
2009	1000000	9500000

Output #10

Output Measure

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

Year	Target	Actual
2009	250	98

Output #11

Output Measure

- Number of presentations on IPM related topics.

Year	Target	Actual
2009	500	762

Output #12

Output Measure

- Number of volunteer hours dedicated to pest management programming

Year	Target	Actual
2009	8000	18154

Output #13

Output Measure

- Number of extended learners with four or more hours of contact related to pest management

Year	Target	Actual
2009	5000	11809

Output #14

Output Measure

- Amount of revenue generated in dollars for pest management Extension and research programming

Year	Target	Actual
2009	500000	3718266

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	Crop acreage impacted by the continued availability of viable pest management tools as a result of pest management strategic planning activities and the communication of pest management information to policymakers
9	Number of localities participating in a pesticide waste disposal program.
10	Number of localities participating in a pesticide container recycling program.
11	Number of participants gaining knowledge about invasive NIS
12	Number of samples evaluated by current and improved plant diagnostics methods leading to better detection and control procedures by producers
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

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	Quantitative Target	Actual
2009	2000	8135

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Private and commercial applicators (certified in Virginia) are required to maintain their licenses by attending a recertification training (or retaking exams) every two years. For most, those individuals must attend (state pesticide control agency)approved training courses. In addition, about 2,000 new applicators enter the system by taking examinations associated with core safety and up to 22 different categories of application.

What has been done
In 2009, IPM content was part of every training course, examination, and training manual. Applicators were required to gain knowledge in IPM in order to pass state certification examinations and as part of recertification education.

Results
Approximately, 2000 applicators passed state certification examinations in 2009 including demonstrating their competency in IPM knowledge. In addition, 3,135 farmers completed workshops in pesticide safety education that included IPM content. Extension also supported or hosted workshops for commercial applicators that included IPM content. About 3,000 individuals completed these workshops successfully in 2009. A total of 8,135 individuals demonstrated that they had knowledge of basic IPM content as a result of this effort.

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
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
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	Quantitative Target	Actual
2009	1000	2000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Private and commercial applicators (seeking certification in Virginia) are required to either attend an approved training course or complete a self-study option in order to be properly prepared to pass state certification examinations. Self-study options include the use of Extension pesticide applicator training manuals or an online course in pesticide safety.

What has been done
In 2009, Virginia Cooperative Extension offered 26 prep courses for 453 new applicators across Virginia. In addition, an online course in pesticide safety was offered to 34 employers (101 employees) for those seeking core training to qualify for commercial and registered technician certification. The course was open for 90 days to assist in preparation to pass the core examination. Finally, self-study was offered through the use of 23 different training manuals prepared by Virginia Tech and Cooperative Extension. In 2009, 3,275 training manuals were sold to applicators to prepare for the core and commercial applicator exams.

Results
As a result of the use of these services, over 2,000 applicators (both private and commercial) gained knowledge that enabled them to pass the state certification exams in 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
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
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	Quantitative Target	Actual
2009	4000	6135

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Private and commercial applicators (certified in Virginia) are required to maintain their licenses by attending a recertification training (or retaking exams) every two years. For most, those individuals must attend (state pesticide control agency)approved training courses.

What has been done
In 2009, Cooperative Extension hosted over 181 private applicator workshops and 35 commercial applicator workshops throughout Virginia. In addition, specialists and agents supported 36 other venues sponsored by third parties and approved for recertification.

Results
Applicators in all of these events were provided new information pertaining to pesticide safety. A total of 6,135 applicators gained knowledge in pesticide safety as a result of attendance and gained recertification credit as part of these activities.

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
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
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	Quantitative Target	Actual
2009	950	5000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Members of the general public, farmworkers, home gardeners, master gardeners, non-certified farmers, registered technicians, and others seek pesticide safety information because of concerns for personal health and safety, environmental concerns, and occupational requirements.

What has been done
Over 216 pesticide applicator training programs held for certified applicators in 2009 were also open to the public. In addition, worker protection training was offered to employers and farmworkers through collaboration with the Telamon Corporation in 30 different locations. Finally, master gardeners and Extension agents offered pesticide safety education as part of over 300 venues to home gardener and other non-certified applicators throughout Virginia.

Results
Over 5,000 non-certified applicators gained knowledge of general pesticide safety as part of Cooperative Extension programs in 2009.

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

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	Quantitative Target	Actual
2009	100	761

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Trainers are the key to effective and available pesticide safety education for pesticide applicators seeking to comply with federal and state laws requiring certification as licensed applicators. Without training these applicators would either have to self-study or go without training thus running the risk of failing the certification exams and operating without the knowledge needed to protect themselves, the public, and the environment from misapplied pesticides.

What has been done
Through six presentations at national pesticide safety educator (trainer) workshops, 20 presentations at two multi-day train-the-trainer workshops, and one trainer/regulator online course we provided new knowledge to 846 trainers.

Results
Approximately, 90% (761) of these individuals gained knowledge in pesticide safety and pesticide curriculum and program training.

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

Crop acreage impacted by the continued availability of viable pest management tools as a result of pest management strategic planning activities and the communication of pest management information to policymakers

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	10000	1950565

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The 1996 Food Quality Protection Act (FQPA) was one of the most significant changes to agricultural pest management in history. As a result the USDA and EPA were ordered by the vice president to work together to transition the impacts of this law to avoid negative impacts to agriculture. One of the key mechanisms developed to give stakeholders direct input into the decision making process was for states to develop IPM documents that describe grower needs and priorities.

What has been done
Virginia has developed 41 specialized integrated pest management (IPM) documents that are used by EPA and USDA in this process of transition decision making. These documents were developed with direct stakeholder input and serve to not only enhance regulatory decision making, but help stakeholders directly through enhanced grant opportunities and adoption of best management practices for IPM.

Results
As a result of this effort, USDA and EPA are able to make informed decisions to transition the industry through FQPA while at the same time minimizing the impact on agriculture. In addition, stakeholders have prioritized IPM data that can be used to justify grants to support industry needs. Finally, Christmas tree growers in Virginia and North Carolina, and beekeepers in the mid-Atlantic states are adopting IPM best management practices documented in IPM Elements documents developed by with their direct input through stakeholder meetings. Growers are using these elements as industry IPM operating standards, and for marketing their crops.

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 #9

1. Outcome Measures

Number of localities participating in a pesticide waste disposal program.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	25	27

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Thousands of pounds of waste pesticides have been generated by farmers and other pesticide users over the years. Much of this waste is the result of inadequate and inefficient planning, hording, and storage. Cleaning up these waste chemicals is highly beneficial to protecting human health and the environment.

What has been done
A statewide collaborative effort between Cooperative Extension and the state department of agriculture has established an ongoing pesticide waste collection program in Virginia. In 2009, this program was implemented in the southeastern region of 27 counties and city units of the state.

Results
In 2009, 95,506 pounds of canceled, banned or unwanted agricultural and commercial pesticides were collected and subsequently destroyed.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
403	Waste Disposal, Recycling, and Reuse
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
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 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	Quantitative Target	Actual
2009	10	28

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Plastic 2.5 gallon containers are the primary means of distribution for farm pesticides. Farmers generate thousands of these containers as waste annually. It highly beneficial for human health and the environment to recycle these containers rather than throw them in a landfill.

What has been done
A collaborative effort between Cooperative Extension and the state department of agriculture has established pesticide waste container recycling sites in 28 localities across Virginia.

Results
In 2009, 45,115 plastic pesticide containers were recycled through this effort.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
403	Waste Disposal, Recycling, and Reuse
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
723	Hazards to Human Health and Safety

804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #11

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	Quantitative Target	Actual
2009	225	1330

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Virginia, invasive species are a threat to human and animal health, profitability and the environment. Major invasive pests have cost millions of dollars to control, in health care, and in crop and property damage. Gypsy moth, red imported fire ant, soybean rust, soybean aphid, emerald ash borer, tiger mosquito, hemlock wooly adelgid, various weeds and animal and plant diseases continue to be a problem.

What has been done
An annual train-the-trainer workshop (the Virginia Pesticide Safety Educators Workshop) includes experts, talks, visual materials and publications on invasive species. An invasive species component is encouraged by trainers to include in their winter pesticide applicator training and IPM programs throughout Virginia. In 2009, 85 Extension agents attended the VPSE workshop. Course approval data indicate that invasive species information was incorporated into pesticide applicator training programs across Virginia in 2009.

Results
In 2009, 85 Extension agents attended the VPSE workshop. Course approval data indicate that invasive species information was incorporated into 181 pesticide applicator training workshops held for 3,135 farmers across Virginia in 2009. Of those meetings 1,330 participants gained knowledge of invasive species.

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
721	Insects and Other Pests Affecting Humans
723	Hazards to Human Health and Safety

Outcome #12

1. Outcome Measures

Number of samples evaluated by current and improved plant diagnostics methods leading to better detection and control procedures by producers

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	1500	1468

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Accurate diagnosis is essential for implementing appropriate plant disease control. Without diagnostic services, many plant problems are misdiagnosed, leading to ineffective and/or unnecessary pesticide applications, which may harm human health, the environment and non-target organisms. For example, approximately 25% of all plant samples submitted to the VT Plant Disease Clinic are diagnosed with abiotic (non-living) problems. In many of these cases, symptoms would mistakenly be attributed to a pest and a pesticide would be applied.

What has been done
The VT Plant Disease Clinic is a service lab for VCE, providing diagnosis and recommendations for commercial growers and homeowners. After diagnosis, an electronic report is sent to the VCE agent, who then gives the information to the grower. In cases where it is too late to apply a pesticide or where cultural controls alone would be effective, growers are advised not to apply a pesticide. In cases where pesticides are recommended, growers are educated about the appropriate pesticide to use and application times for effective disease control.

Results
In 2009 the PDC provided diagnoses and control recommendations for 1468 plant samples and responded to 124 electronic plant problem inquiries. Agents in 95 of the 106 Virginia counties used the lab's services in 2009 and received reports, on average, within 5 days. By providing timely and accurate diagnoses, the PDC supports integrated pest management. Preliminary commercial grower survey results reveal that 93% of commercial grower survey respondents (31 responses of 81 surveyed) who used the PDC services in 2009 think the PDC's diagnostic recommendation increased their knowledge of pest and abiotic problems in their operation, 40% thought that it reduced their pesticide inputs, and 90% thought it increased the quality of their crop and 97% thought the recommendation increased their profitability.

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

Outcome #13

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	675

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Soybean rust is caused by a fungus that overwinters in the Gulf States Region and more southerly regions where temperatures generally are above 40 degrees on living leaves of kudzu and other hosts. After the disease moves into early planted soybeans, it can spread rapidly by windborne spores to soybeans throughout the U.S. Early detection and fungicide applications are necessary to control this devastating disease.

What has been done
Virginia meetings and field tours included talks on detection and control of soybean rust. About 150 copies of "Soybean Rust Management in the Mid-Atlantic Region" were distributed. Timely updates on the monitoring program were uploaded to the USDA ipmPIPE website (http://sbr.ipmpipe.org/cgi-bin/sbr/public.cgi). Results of fungicide trials and sampling fields for early detection of SBR were published on the Virginia Cooperative Extension website at http://pubs.ext.vt.edu/. In addition, the Virginia Asian Soybean Rust website (http://www.ppws.vt.edu/ipm/soybeanrust/index.htm) was maintained as a comprehensive educational resource for identification and management of soybean rust.

Results
The Virginia soybean rust monitoring program and educational efforts have been highly effective in detecting soybean rust in its earliest stages of development. Producer education efforts, website and hardcopy resources, and producers' positive perception of the Virginia soybean rust monitoring program has resulted in their adherence to timely fungicide application recommendations disseminated through the monitoring program. The result is that needless fungicide application to control this potentially devastating disease on 580,000 acres of soybean in 2009 ($35/A) was avoided. This has increased profitability and avoided deleterious effects to the environment, human health and non-target organisms.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants

Outcome #14

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Soybean rust is caused by a fungus that overwinters in areas where temperatures generally are above 40 degrees on living leaves of kudzu and other hosts. After the disease moves into early planted soybeans, it can spread rapidly by windborne spores to soybeans throughout the U.S. This pattern of disease spread has occurred annually since 2006 to reach soybeans in Virginia. Fungicides are necessary to control this disease.

What has been done
Ten soybean sentinel plots were established and monitored for early detection of soybean rust. Samples were processed weekly at the Tidewater and Eastern Shore research stations and the Virginia Tech Plant Disease Clinic. Weekly reports were posted on the USDA ipmPIPE website. County and area-wide educational meetings and field tours included talks on the status and control of soybean rust. About 150 copies of the "Soybean Rust Management in the Mid-Atlantic Region" were distributed to county agents for clientele in 2009.

Results
A total of 220 samples of leaflets were processed for detection of soybean rust in 2009. All occurrences of soybean rust were detected in fields with plant development beyond the full seed stage, and incidence was low until leaf senescence prior to full maturity. No loss of yield to soybean rust was observed and no fungicide applications for its control were recommended. Since 2006, this program has been highly effective in detecting the disease in it earliest stages of development. As a result, fungicide applications for control of soybean rust in Virginia have not been recommended, which saved growers up to $35/A for applications of fungicide on 580,000 acres of soybean in 2009.

4. Associated Knowledge Areas

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

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 (Stakeholder cooperation, violations)

Brief Explanation

As with most states, Virginia has suffered budget shortfalls which have resulted in reductions in funding and personnel available to support this program. Remaining agents and faculty are being stretched to cover more so many efforts are being trimmed. In addition, 2009 was an extreme year in terms of the weather. Unusually cool, wet spring conditions lasted into early summer and as a result, grey garden slugs ruined thousands of acres of the soybean and corn crops. We are unprepared for this pest; have little experience dealing with it, and even less in terms of satisfactory crop protection recommendations for growers. After a relatively brief dry period in July through August, rains commenced and came at such a frequency that crop maturity, especially soybean, was delayed, and worse, harvest of the soybean and cotton crops was delayed, in some areas, until after Christmas. These additional stresses complicated growers' crop management programs, interfered with monitoring programs and critical remedial actions, and often diverted attention from the normal activities used to properly manage crop pests.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention
- Other (Publication user surveys)

Evaluation Results

Bluegrass Billbug Survey

Since 2005, we have worked to evaluate and adapt a degree-day (DD) program developed for the bluegrass billbug to predict the most effective spring timing of an insecticide to kill the adults before peak oviposition. In 2005, we set up an electronic listserv of orchardgrass growers, extension agents, and agribusiness professionals. We have anecdotal evidence indicating that individuals have successfully used our DD alerts for timing the spring adulticide application since 2006. In Dec. 2008 a four-question survey was developed with five multiple-choice responses per question (strongly agree; agree; disagree; strongly disagree; and not applicable) and sent electronically to the 23 individuals on the orchardgrass listserv. Seven of the 23 individuals completed the survey for an overall response rate of 30.4%. More than 95% of the respondents reported agreeing or strongly agreeing with each of the questions: 1. "The HB and BGB degree-day program

updates for orchardgrass has helped me improve my pest management decisions for these pests on my farm "; 2. "The HB and BGB degree-day program updates for orchardgrass has helped me improve my pest management recommendations for my clientele"; 3. "I recommend that the HB and BGB degree-day program currently being offered by Virginia Tech be continued"; 4. "I have recommended the HB and BGB degree-day program to other end users". In addition, several respondents reported that the DD alerts for the bluegrass and hunting billbugs have positively impacted their pest management decision making on about 7,000 acres since its inception in 2006.

Urban Master Gardener Website Survey

To assess the impact of three websites [Virginia IPM (www.vaipm.org), Departmental IPM website (http://ppwsipm.contentsrvr.net/), Plant Problem Image Gallery (http://ppwsidlab.contentsrvr.net/plant.vesh] on adoption of IPM and increased knowledge of plant diagnosis, Master Gardeners (MGs) in 19 urban Virginia counties were asked to complete an online survey. 334 MGs from 17 counties responded. Sixty-seven percent were aware of and use the Virginia IPM website. However, 61% and 66% were not aware of the Plant Problem Image Gallery and the Departmental IPM website, respectively. Ten percent regularly and 25% occasionally use the Plant Problem Image Gallery; 6% regularly and 17% occasionally use the Departmental IPM website. Fifty-two percent indicated that these websites helped them to better educate Extension clientele about IPM. Fifty percent indicated that the Plant Problem Image Gallery helped them to identify plant problems more accurately and 30% indicated that the website helped them give better control recommendations that included IPM practices to Extension clientele. Of the 102 MGs who added a comment 33% said they had not, previous to the survey, been aware of these websites and overwhelmingly indicated that they found them useful and planned to use them in the future. A number of MGs suggested specific ways to increase awareness of these websites. The results from the survey will be used to improve awareness of these websites and make improvements to the websites.

Key Items of Evaluation

The "Urban Master Gardener Survey" demonstrated the positive impact of the three websites on adoption of IPM and increased knowledge of plant problems by Master Gardeners (MGs). Also, optional comments made by about 31% of the total respondents (334), overwhelmingly indicated that these websites were viewed very favorably as generally excellent resources for MGs on plant problems and IPM and it is very likely that other users of these websites (e.g. landscape professionals, consumers, Extension agents) would feel similarly. Consumer applications of pesticides have a significant impact on environmental and human health. Both MGs and landscape/arborist professionals often function as primary educators of consumers and urban clientele, yet their training in pest diagnosis and management may be quite limited. For example MGs typically have only a single class on plant problem diagnosis and individual certified arborists have diverse educational backgrounds that may or may not include extensive pest identification and/or IPM training. These websites have been designed to increase the relevant plant diagnostic and IPM educational resources available to these groups. Additionally, the plant problems featured in the Plant Problem Image Gallery are diseases likely to be encountered in Virginia and, so are very relevant to Virginia MGs working an Extension help desk or clinic and landscape professionals encountering problems in the landscape. The major problem identified from this survey is the lack of awareness of these websites among MGs. There are a number of tactics that we plan to implement in the coming year to increase awareness of these websites to this group of potential users and help ensure these valuable IPM and plant problem resources are more fully utilized.

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

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	10%	10%	10%	10%
201	Plant Genome, Genetics, and Genetic Mechanisms	10%	10%	10%	10%
202	Plant Genetic Resources	10%	10%	10%	10%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	5%	5%	5%	5%
205	Plant Management Systems	25%	25%	25%	25%
206	Basic Plant Biology	5%	5%	5%	5%
216	Integrated Pest Management Systems	5%	5%	5%	5%
403	Waste Disposal, Recycling, and Reuse	5%	5%	5%	5%
511	New and Improved Non-Food Products and Processes	5%	5%	5%	5%
601	Economics of Agricultural Production and Farm Management	10%	10%	10%	10%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%	10%	10%	10%
	Total	100%	100%	100%	100%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	30.0	0.0	5.3	3.0
Actual	36.4	2.0	31.1	3.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
920372	221766	581975	674021
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1193183	133176	1951009	535867
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
2336321	39880	5716853	263560

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 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.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	100100	236300	14900	35200
Actual	173967	248013	42591	8436

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

Patent Applications Submitted

Year: 2009
Plan: 1
Actual: 1

Patents listed
Plant Variety Protection Certificate Awarded to Wheat Cultivars Shirley, '3434', and '5205'

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total

Plan	8	25	
Actual	5	37	42

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational presentations conducted

Year	Target	Actual
2009	500	1019

Output #2

Output Measure

- Number of volunteers

Year	Target	Actual
2009	5000	8445

Output #3

Output Measure

- Number of research studies completed on biofuels or novel biobased products

Year	Target	Actual
2009	12	8

Output #4

Output Measure

- Number of research publications on biofuels or novel bio-based products

Year	Target	Actual
2009	6	7

Output #5

Output Measure

- Number of research citations

Year	Target	Actual
2009	100	72

Output #6

Output Measure

- Number of outreach citations

Year	Target	Actual
2009	5	445

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of commercial producers educated about new plants, cultivated varieties, production techniques or BMPs
2	Number of commercial producers adopting new plants, cultivated varieties, production techniques, or BMPs
3	Number of noncommercial gardeners/producers educated about new techniques or BMPs
4	Number of noncommercial gardeners adopting new techniques or BMPs
5	Number of new cultivated varieties released
6	Contribution of Master Gardener Volunteers
7	Improved efficiency in Burley tobacco production
8	Development of vegetable soybeans as an alternative crop for Virginia producers.
9	Studies of biological N-fixation and seed composition traits of tepary bean
10	Studies of the plant defense system for crop stress tolerance improvement
11	Development of new light management strategies in tomato greenhouses
12	High tunnel production increases farm profitability

Outcome #1

1. Outcome Measures

Number of commercial producers educated about new plants, cultivated varieties, production techniques or BMPs

2. Associated Institution Types

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	10000	15355

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia tobacco farmers planted and harvested 17,000 acres of flue-cured tobacco in 2009. This crop had a value of approximately $70.5 million. Flue-cured tobacco growers require the most recent and unbiased production information to make management decisions to remain profitable in a global market with shrinking profit margins.

What has been done
Extension Tobacco Specialists and Agents with tobacco responsibilities develop and deliver educational programs containing the latest production information to flue-cured tobacco producers. Tobacco meetings, on-farm research plots, field days, and newsletters are utilized to reach and provide tobacco growers with current information needed to make informed management decisions.

Results
Flue-cured tobacco educational programs reach over 60% of the approximately 400 flue-cured tobacco growers, annually. Producers attending and completing evaluations unanimously reported that the information provided in educational programs was beneficial in making management decisions. Seventy-five percent (75%) of producers plan to make one or more changes to their production practices based on information provided.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
216	Integrated Pest Management Systems
403	Waste Disposal, Recycling, and Reuse
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Number of commercial producers adopting new plants, cultivated varieties, production techniques, or BMPs

2. Associated Institution Types

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	600	220

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Fuel and fertilizer cost have increase farm production expenses nearly 50% over the last 5 years. And farmers in the Piedmont region of Virginia are looking for strategies to cope with increasing fuel and fertilizer cost. One strategy employed by many farmers was to reduce the amount of fertilizer applied to forage land, which has a negative impact on forage yield and profitability. According to soil test summaries from Virginia Tech, 75% of the region's pasture and 65% of the hayfields are medium to low in soil test phosphorus. Therefore, reducing fertilizer applications to forages is counterproductive by lower livestock stocking rates and reducing hay yields. To maintain farm profitability, farms must maintain a reasonable level of soil fertility with the use of more economical phosphorus sources.

What has been done
Farmers are using poultry litter to reduce the cost of fertilizing crops. Poultry litter costs $35/ton spread compared to $73 per acre for commercial fertilizer that provides an equivalent amount of nutrients. Data was collected from 22 farms (4,400 acres) to prepare nutrient management plans. Data collected included soil samples, soil maps, FSA maps, three year crop rotations information and poultry litter samples.

Results
Producers who use a nutrient management plan and test their soil have been able to apply the proper amount of commercial fertilizer to supplement the less costly poultry litter. A nutrient cost analysis was prepared for each farm and revealed that each farm saved an average of $42.18 per acre on fertilizer cost over a three year period, which is a total savings $185,592 for all enrolled farms and qualified for a $15/acre/application through the NRCS EQIP poultry litter transfer program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
202	Plant Genetic Resources
205	Plant Management Systems

403	Waste Disposal, Recycling, and Reuse
601	Economics of Agricultural Production and Farm Management

Outcome #3

1. Outcome Measures

Number of noncommercial gardeners/producers educated about new techniques or BMPs

2. Associated Institution Types

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	100000	694831

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Northern Neck of Virginia contains well over 1,000 linear miles of shoreline draining into the Chesapeake Bay. Development of this critical area from farm and forest land to residential waterfront has contributed to the decline of water quality, biodiversity, and seafood harvest in the Chesapeake Bay. Mismanagement of lawns has been identified by state and federal agencies as a leading root cause of the decline.

What has been done
VCE developed and conducted a half-day workshop for homeowners and lawn managers known as "Beautiful Lawn, Healthy Bay." The program focused on best management practices that provide for green, healthy turf while minimizing the environmental footprint of lawn management. A portion of the program also focused on the use of native plants and other groundcovers as an aesthetically-pleasing and environmentally-friendly alternative to lawns, especially in sensitive areas such as shorelines.

Results
A written evaluation showed that, of the 42 participants taking part in this program, over 75% of the attendees said that they would fertilize their lawn according to soil test results, change the timing of their fertilization (apply nitrogen in fall, not spring), and carefully select and safely use the correct pesticide. The remainder of attendees said that they were already doing these things. When asked to rate their gains in knowledge at the program on a scale of 0 to 5, participants indicated an average of 4.9, with 5 being the most knowledge gained.

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
403	Waste Disposal, Recycling, and Reuse
511	New and Improved Non-Food Products and Processes

Outcome #4

1. Outcome Measures

Number of noncommercial gardeners adopting new techniques or BMPs

2. Associated Institution Types

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	5000	1102

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In 2007, the Virginia Cooperative Extension Master Gardener (VCE-MG) program implemented the VCE-MG Educational Committee to assess emerging county needs and areas which were underserved by Extension programming. The VCE-MG Educational Committee, which received training on Educational Design, Implementation, and Evaluation, identified three areas that were underserved by Extension programming.

What has been done
In 2008, two separate education teams were formed to address issues related to Urban Nutrient Management and Natural Gardening. These two groups were led by Eric Bowen in establishing educational design, implementation and evaluation of these two proposed projects.

Results
In 2009, the Urban Nutrient Management program was initiated and marketed as the SMART Lawns program developed by Henrico County Master Gardeners. The SMART Lawns program had 79 participants and impacting 1.75 million square feet of managed turf. Participants of the program received site visits by volunteers that calculated total square footage of tested areas, generated site maps, reviewed soil test recommendations, and participants received information regarding best management practices in relation to turf fertilization.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
216	Integrated Pest Management Systems

403	Waste Disposal, Recycling, and Reuse

Outcome #5

1. Outcome Measures

Number of new cultivated varieties released

2. Associated Institution Types

- 1862 Extension
- 1862 Research
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	6	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results
Registration of 'Bailey' Virginia-Type Peanut Cultivar
Registration of 'USG 3555' Wheat

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
601	Economics of Agricultural Production and Farm Management

Outcome #6

1. Outcome Measures

Contribution of Master Gardener Volunteers

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
For more than 30 years, Extension Master Gardeners have assisted state and county faculty in providing current, relevant, research-based, and timely responses to Virginia's homeowners. As personnel resources diminish, we rely more heavily on our volunteers to help deliver quality programming and services to our constituents. Their work multiplies the efforts of our paid faculty as they impart best practices to homeowners wishing to manage their landscapes in sustainable and environmentally friendly ways.

What has been done
In 2009, more than 800 additional Extension Master Gardeners were trained and certified. Extension agents, specialists and veteran Master Gardeners all worked to provide quality training to this new cohort of volunteers. Once training was completed, opportunities to volunteer and employ their new training were provided to the new MG interns.

Results
In 2009, there were more than 5,000 volunteers total working on behalf of local extension offices providing service and educational programming to more than 575,000 constituents. In the course of working with Virginia's citizens, Extension Master Gardeners reported in excess of 331,000 volunteer hours. The volunteer time was equivalent to 166 full-time equivalents. This means that collectively, Virginia Cooperative Extension had an additional 166 full-time staff disseminating best practices information. The economic value of the reported volunteer time exceeds $6.7 million (based on an hourly rate of $20.25 from the independent sector). This is a tremendous in-kind contribution and return on investment to the Commonwealth of Virginia.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
216	Integrated Pest Management Systems

Outcome #7

1. Outcome Measures

Improved efficiency in Burley tobacco production

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Virginia, burley tobacco production has increased each year post buyout, more than doubling in some counties since 2004. Burley tobacco production is significantly different in terms of varieties, fertilization, harvest and curing practices than flue cured tobacco, Pittsylvania County's traditional tobacco crop. Agricultural producers have requested access to current research designed for burley growers to increase profitability.

What has been done
VCE and Southern Piedmont AREC faculty developed a variety of educational programs to address the needs of burley tobacco growers. Specialists contributed research from variety evaluations and agronomic studies. Extension agents conducted on-farm research trials with cooperating growers, and organized production meetings where specialists provided information directly to growers and answer specific questions. Formal field days were organized to showcase the variety of harvesting equipment.

Results
Variety selection, proper fertilization, and improved management strategies have contributed to a rise in state average yields of 23% since 2004, generating an additional $900/acre. Labor reductions during on-farm testing of harvest and stripping aides have resulted in a savings of 25 to 50% corresponding to $250-500/acre savings. Irrigation work has reduced water and fuel consumption by approximately 30% during on-farm trials. In addition, nearly 450 Burley Production Guides have been distributed throughout the state and variety trial data updates produced each year. During the Burley Production Meeting in Gretna, VA, 100% of participants indicated that as a direct result of that meeting they would make one or more changes to their production strategy.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
202	Plant Genetic Resources
205	Plant Management Systems
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management

Outcome #8

1. Outcome Measures

Development of vegetable soybeans as an alternative crop for Virginia producers.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia farmers face challenges in today's competitive agricultural environment. Farmers who depended on tobacco as a cash crop are especially affected. Tobacco acreage has been on a downward trend for decades and production has plummeted in the U.S. over the past eight years because of decline in the number of smokers and competition from imports. Vegetable soybean [Glycine max (L.) Merr.] is one of the potential crops that can contribute to the income of small farmers who were adversely affected by declining tobacco production. The demand for vegetable soybean (edamame) is growing because it is a cholesterol-free source of protein and has very low saturated fat content. Lack of suitable cultivars is one of the limiting factors for widespread production of vegetable soybean in Virginia.

What has been done
A project at VSU is developing vegetable soybean cultivars that are suitable to Virginia conditions. The project has the following specific objectives: to evaluate and identify vegetable soybean varieties with high seed yield, desirable agronomic traits and nutritional values; to isolate soybean pod-shattering genes and develop gene-based markers to assist in the selection; and develop varieties suitable for processing.

Results
A study was conducted to obtain information on the inheritance of seed traits and to identify the best parents for cultivar development. This study showed that estimates of both the combining ability (general and specific) and reciprocal variances were significant for seed traits (raffinose and stachyose) studied. In both F2 and F3 analyses, the GCA ratios for both raffinose and stachyose were high. These ratios indicated the predominant role of additive genetic variance in the inheritance of raffinose and stachyose. Genetic information on combining ability and the type of gene action that governs the inheritance of economically important quantitative characters can be helpful to breeders. Such information can also assist vegetable soybean breeders in selection of suitable parents and the appropriate breeding procedures. Ultimately such research conducted at VSU will help to commercialize the production of soybean cultivars that would be suitable for manufacture of nutritious and palatable soybean products.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources

Outcome #9

1. Outcome Measures

Studies of biological N-fixation and seed composition traits of tepary bean

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Farmers in Virginia and southeastern states are in need of a crop that can be planted following wheat in summer and that is ready to be harvested before the next wheat crop is planted in the fall. One of these crops that can fit such rotation is tepary bean (Phaseolus acutifolius A. Gray). Tepary bean is highly drought and heat tolerant, and produces nutritious, high protein seed that is suitable for human consumption.

What has been done
The purpose of the project is to develop tepary bean varieties adapted to Virginia's agroclimatic conditions. The objective of this year's research was to identify most efficient bradyrhizobial strains for biological nitrogen fixation by tepary bean.

Results
In these experiments root nodulation following inoculation with different strains was characterized. Nodule color, nodule number, and nodule size were recorded from approximately 40-day old plants. Significant differences were observed among 15 bradyrhizobial strains for all traits under study. Results validated the previous observations that UMR-3007, UMR-3043, and USDA-3254 strains were the most efficient nodulators of tepary bean. Considerable progress has been made to utilize tepary bean as a summer legume cover crop to meet nitrogen needs of succeeding winter wheat crop in Virginia. The research contributes towards the development of tepary bean as a short-season, summer crop for food and feed to diversify cropping systems and helps improve human nutrition.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

Outcome #10

1. Outcome Measures

Studies of the plant defense system for crop stress tolerance improvement

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Environmental stresses, such as pathogen and insect infections, drought and high salinity, continuously threaten land plants growing during their life cycles and become the biggest challenges for agriculture production. These adverse environmental factors have affected crop productivity for almost all crop species and caused significant economic losses. In the United States alone, the direct economic loss due to these environmental stresses is tens of billions of dollars each year. Both basic and applied research is needed to focus on improvement of crop tolerance to such biotic and abiotic stresses in order to solve this environmental challenge. Jasmonic acid (JA) is a plant hormone that plays pivotal roles in plant defense responses such as wounding, insect resistance, water deficit, and pathogen resistance. However, current knowledge about JA signaling pathways is limited and many genetic components on these pathways are yet to be determined. The current project is focusing on genetically and physiologically characterizing previously isolated mutants involved in JA signaling pathway in Arabidopsis thaliana.

What has been done
Salt tolerance was performed for all 12 mutants on a medium supplement with different concentrations of NaCl (50mM, 100mM, 150mM and 200mM). Drought tolerance was also evaluated using a medium supplement with different concentrations of mannose to generate osmotic stresses (100mM, 200mM, 300mM and 400mM). Root length was measured as criteria for drought tolerance ability. Preliminary data showed that, unlike salt tolerance, variations on drought tolerance were small among all JA mutants with only 10B6 resistant and 5B29 sensitive to the osmotic stress; others were similar to parental line control.

Results
This research provided evidence of interaction between JA and Abscisic Acids (ABA) in regulating plant environmental stress tolerance. Such results will ultimately help to develop new strategies for improving crop environmental stress tolerance.

4. Associated Knowledge Areas

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

Outcome #11

1. Outcome Measures

Development of new light management strategies in tomato greenhouses

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Production of tomatoes in greenhouses and high tunnels could provide an alternative source of income to small and limited resource farmers during the colder months. But high costs energy is a major limiting factors in growing tomatoes in greenhouses and high tunnels. This project supports limited-resource greenhouse vegetable growers that do not use artificial lighting during the winter months. Most produce high-value vine-ripened tomatoes for the late winter to early summer market.

What has been done
Quantification of photosynthetic activity of greenhouse tomato leaves during low-light winter conditions indicated that cooler temperatures did not significantly reduce photosynthetic activity and that heating costs could be reduced during periods of cloudy weather. Total fruit weight (green and ripe) of hydroponic tomatoes grown under cooler greenhouse conditions was the same as in warm conditions (September-December); however, tomatoes ripened faster in the warmer greenhouse with 20% greater yield of red tomatoes.

Results
Greenhouse temperatures were shown to affect tomato ripening but not yield in the low light conditions of fall/winter. This may allow growers to save energy during cloudy periods, and may help to manage harvest yields to fit market conditions.

4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

High tunnel production increases farm profitability

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Vegetable, berry, and specialty crop growers are usually able to command premium prices for their produce when they can enter the market earlier or remain in the market later than their competitors. Small-scale vegetable growers in other states have adopted the use of high tunnels as a production method to extend the season and increase product quality. The major benefits of using a high tunnel are growing season extension, increased crop yields, and a higher quality product.

What has been done
Most small-scale Virginia farmers lack the knowledge of and experience with this production system and have yet to adopt it. VSU extension has developed demonstrations, both on-farm and research station, to educate growers about: production, construction, and economics of high tunnels. Various crops including vegetables, berries, and flowers have been presented as potential high tunnel crops.

Results
Through various extension activities over 1000 persons have learned about high tunnels. Through farmer education about season extension with high tunnels, ten small farmers have built high tunnel structures and reported a 10-15% increase in farm income.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Unusually wet spring weather followed by dry summer conditions reduced yields and increased input costs for research and producer production. State budget conditions limited programs and in some cases faculty travel. The generally poor economy reduced attendance and participation in many educational programs.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Case Study

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

Climate Change

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
133	Pollution Prevention and Mitigation	50%	0%	0%	0%
403	Waste Disposal, Recycling, and Reuse	50%	0%	0%	0%
605	Natural Resource and Environmental Economics	0%	0%	100%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

This is a new Planned Program for Virginia. We are only reporting on unplanned state defined outcomes this year.

2. Brief description of the target audience

This is a new Planned Program for Virginia. We are only reporting on unplanned state defined outcomes this year.

V(E). Planned Program (Outputs)

1. **Standard output measures**

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual	0	0	0	0

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

   Year: 2009
   Plan:
   Actual: 0

Patents listed

3. **Publications (Standard General Output Measure)**

   Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan			
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- This is a new Planned Program for Virginia. We are only reporting on unplanned state defined outputs this year.
  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	Improve Virginia citizens understanding of natural resource conservation and recycling
2	Increase citizen's understanding of Ecosystem Services Markets
3	Improve the understanding of the environmental and economic effects of alternative GHG emission reduction targets

Outcome #1

1. Outcome Measures

Improve Virginia citizens understanding of natural resource conservation and recycling

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	161

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Climate change according to the Environmental Protection Agency (EPA) is an increase in global temperatures and change in rainfall patterns, snow and ice cover, and sea level due to increased amounts of heat-trapping greenhouse gases (GHG) in the atmosphere. Industrial processes (such as the production of cement, steel, aluminum), agriculture, forestry, waste management, and other human activities are major sources of GHG emissions in the United States. The manufacturing, distribution, and use of products, as well as management of the resulting waste, all result in GHG emissions. Sources of reduction, pollution prevention, and recycling programs are an important part of reducing or eliminating GHG emissions (EPA, 2008).

What has been done
The Tour De Trash was designed as part of the Waste Watchers Committee of the Hampton Clean City Commission. The six hour school bus tour visits eight different sites. Each site teaches how different wastes can be recycled to reduce the use of natural resources in their production. At the Hampton Yard Waste Transfer Site the attendees learn how they can dispose of their yard waste for recycling. At the Bethel Landfill they learn how a landfill is created layer by layer and how the Hampton site uses the methane produced to create electricity. At the VPPSA Composting Facility the attendees see how Hampton, York County, and Poquoson recycle their yard waste on site into composted mulch and soil. The Hampton's Steam Plant is a waste to energy site where the attendees learn how waste is burned for steam and processed into energy with advanced filtering to eliminate toxic gases released from combustion. The Hampton Golf Course teaches the attendees how land can be recycled and reused, that was once a landfill. At Branscome Construction they learn how asphalt and concrete can be re-used in construction and how the oils emitted can be used for fuel to run the process. The ARC Recycling Facility shows attendees how disabled citizens can deconstruct computers and other electronic equipment to recycle virtually all the parts. At the TFC Recyclables Transfer Site they learn how recyclables are separated and bailed for transfer to business for use in manufacturing.

Results
Short Term: Through six separate tours 161 Adults and Children were able to demonstrate that they learned 15 different facts about how to reduce, reuse, and recycle waste to reduce the strain on raw materials.
Medium Term: The attendees will have the ability to physically reduce the amount of waste that enters the landfill which will extend the life of the landfill keeping the City of Hampton from outsourcing its waste and therefore reduce the potential cost of waste management for the citizen's.
Long Term: The added skills and values learned from the tour will give the attendees the knowledge and ability to reduce their carbon foot print and add value to their view of natural resources in their immediate community and

globally.

4. Associated Knowledge Areas

KA Code	Knowledge Area
403	Waste Disposal, Recycling, and Reuse

Outcome #2

1. Outcome Measures

Increase citizen's understanding of Ecosystem Services Markets

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	547

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Ecosystem services are part of the solution to social, environmental, and economic challenges to our natural resources. The Southern Group of State Foresters, Governor's Climate Change Commission, industry representatives, consulting foresters, landowners, and local decision-makers expressed the need to know how new ecosystem services initiatives will impact their operations and profitability.

What has been done
In 2009, a forestry and natural resources agent coordinated three landowner-focused seminars, two professional society meetings, and one national conference to provide research-based ecosystem services information to 547 participants.

Results
Evaluations from the broad-based ecosystem services educational program illustrated the following: at least 2 consulting foresters are now offering carbon credits, 3 attendees formed a new group to collaborate on a grant proposal, and 1 professor began incorporating ecosystem services into his teaching and research, among other impacts. One sponsor has contributed $1 million to protect the ecosystem services generated by working forests in southeast Virginia. An additional $1.2 million was estimated by participants as the cumulative value of knowledge gained.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation

Outcome #3

1. Outcome Measures

Improve the understanding of the environmental and economic effects of alternative GHG emission reduction targets

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Global annual emissions of anthropogenic greenhouse gases (GHG) increased by 70% between 1970 and 2004, with emissions of carbon dioxide (CO2) increasing by 80% (Intergovernmental Panel on Climate Change - IPCC). Atmospheric concentration of CO2 has increased from a pre-industrial value of 280 ppm to 379 ppm in 2005, due mainly to fossil fuel use. This concentration level is much higher than any time in the past 650,000 year. Increases in atmospheric GHG concentrations lead to increased concerns about future increases in global surface temperatures. In order to limit the predicted increase in global surface temperature to 2° C, the IPCC recommends that GHG emissions need to be reduced by at least 50-85%, compared to their 2000 level, by 2050.

What has been done
A collaborative research project with Joachim Schleich from Fraunhofer (ISI), a research institute in Karlsruhe, Germany that specialized in energy and environmental economics research, was begun. The objective of this research is to compare the environmental and economic effects of alternative GHG emission reduction targets for developed and developing countries for the period 2010 through 2030.

Results
Preliminary results for scenarios where Annex I countries decrease their emissions by 30% from 1990 levels while developing countries decrease their emissions by 15% from 1990 levels indicate that achieving these targets is not costly in terms of reductions in GDP growth rates. For most countries, GDP growth rates would be no more than 0.1% lower from adopting emission reduction policies compared to not adopting these policies. However, for some fasting growing and carbon intensive developing countries, like China and India, the reduction in GDP growth rates would be about 0.2% per year. These results were presented to the German Environmental Protection Agency and were used by the German delegation to the UNDCCC climate conference in Copenhagen, Denmark in December 2009.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 12

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
703	Nutrition Education and Behavior	50%	0%	0%	0%
724	Healthy Lifestyle	50%	0%	0%	0%
	Total	100%	0%	0%	0%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

audiences; and respond to consumer inquiries.

2. Brief description of the target audience

Childhood Obesity, Nutrition and Fitness: young children (ages 2 - 5 years); school-age children; adolescents; parents, foster parents, and grandparents; caregivers (in-home and for-profit day care providers); teachers and other school faculty for young children, youth, and adolescents; school food service workers and managers; school wellness committees; school nurses and other health care providers; and Extension educators.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual	0	0	0	0

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

Year: 2009
Plan:
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan			
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of middle school children and adolescents reached through Healthy Weights for Healthy Kids and other programs integrated with school physical education classes and structured sports activities.

Year	Target	Actual
2009	{No Data Entered}	1913

Output #2

Output Measure

- Number of school wellness committee members attending at least one training session on school policies and activities that can help prevent or assist in reducing childhood obesity.

Year	Target	Actual
2009	{No Data Entered}	30

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of middle school children and adolescents reached through Healthy Weights for Healthy Kids and other programs integrated with school physical education classes and structured sports activities who increased their knowledge of healthy eating and the need for regular physical activity.

Outcome #1

1. Outcome Measures

Number of middle school children and adolescents reached through Healthy Weights for Healthy Kids and other programs integrated with school physical education classes and structured sports activities who increased their knowledge of healthy eating and the need for regular physical activity.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1530

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Over the past 30 years the number of overweight children and teens has nearly tripled with the result that one in three children in the U.S. between the ages of 6 and 19 is overweight or obese. This problem of epidemic proportions presents a major public health challenge to parents, schools, and health care professionals. Both formal and informal programs offer valuable access to children of all ages and their parents, and caregivers. Head start and other day care providers and grades K-12 provide access to children and youth on a daily basis with on-going opportunities for nutrition and health education to prevent the development and provide targeted intervention to existing childhood overweight. School and preschool breakfast and lunch not only provide healthy food but also model appropriate meals and snacks. Nutrition and health education can be a part of the formal school curriculum meeting Standards of Learning in science and health and also be included in after-school and recreational summer and winter youth activities. Training for preschool and K-12 teachers, school food service managers, and school wellness committee members, along with presentations and printed materials for parents are comprehensive strategies to combat childhood overweight.

What has been done
To expand the school-based opportunities to reach middle school children with lessons on healthy eating and appropriate levels of physical activity, FCS agents successfully initiated partnerships with coaches and physical activity teachers. In that coaches and physical activity instructors are strong role models for this age group, these pilot programs have significant potential for encouraging exercise and fitness.

Results
Middle school students increased their knowledge of healthy eating and the need and duration of physical activity that promotes healthy weight and fitness, regardless of body size.

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

- Other (New activity)

Brief Explanation

Major reporting on child obesity programs for the 2009 reporting year can be found under Food, Nutrition and Health. The outputs reported here represent two new areas of activity initiated this past year that have strong impact potential for the new planned program of childhood obesity and seemed worthy of special attention at this time.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 13

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
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	100%	0%	0%	100%
	Total	100%	0%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conducted educational classes, workshops, meetings, and trainings, develop products, curriculum, resources, facilitated coalitions and/or task forces, conduct assessments and community surveys, partnered 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, commercial food processors, individuals with limited education and financial resources.

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual	0	0	0	0

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

Year: 2009
Plan:
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan			
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- The number of adults who demonstrate improvement in food thawing techniques and food handling techniques which results in acceptable food safety practices.

Year	Target	Actual
2009	{No Data Entered}	6590

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	The number of adults who limited income adults who demonstrate improvement in food thawing techniques and food handling techniques which results in acceptable food safety practices.
2	Studying the microbiological and chemical safety of raw meats sold on the internet

Outcome #1

1. Outcome Measures

The number of adults who limited income adults who demonstrate improvement in food thawing techniques and food handling techniques which results in acceptable food safety practices.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	6590

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
To reduce the likelihood of food borne illness as a result of improper food handling in the home.

What has been done
Provide instruction on proper food safety practices targeted to individuals with a limited income and educational background.

Results
2993 participants demonstrated improvement in the food thawing methods.

1387 participants demonstrated improvement in decreasing the time foods are left out at room temperature.

4628 participants demonstrated acceptable food safety practices at the completion of the FNP program.

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

Studying the microbiological and chemical safety of raw meats sold on the internet

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

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 meat items. This business approach satisfies consumers' desires in procuring perceived high-quality products directly from producers or stores by mail delivery. This practice, in general, reduces the steps associated with getting products to the consumers; however, it may also bypass some inspection and testing procedures traditionally established by buyer or government agencies. Presently, food safety data related to food products in this emerging market is lacking.

What has been done
This study 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 of the study suggest that frozen ground meat products from the Internet are more likely to have contamination with Escherichia coli and high levels of spoilage organisms than locally available frozen beef patties. Thus, careful handling and cooking of raw and frozen meat, regardless of market source, by the consumers is required to prevent foodborne illness. Results also suggest that Internet fish products are equally as likely as or more likely to be excessively contaminated with bacteria than are locally purchased fillets. This study identified differences in microbial quality between locally purchased products and products sold on the Internet, but additional research is needed to determine the cause(s) of the observed deviations.

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

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

Evaluation Results

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 14

1. Name of the Planned Program

Global Food Security and Hunger

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
604	Marketing and Distribution Practices	20%	0%	0%	0%
703	Nutrition Education and Behavior	40%	0%	0%	0%
704	Nutrition and Hunger in the Population	40%	0%	0%	0%
	Total	100%	0%	0%	0%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	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 and hands-on, and meetings to provide training for stakeholders and educators;
Develop products, curriculum, and resources for use by educators and directly by producers;
Organize and conduct state and regional conferences;
Partner with industry;
Conduct needs assessment and impact analysis.

2. Brief description of the target audience

Extension educators
Industry personnel
Commercial producers
Consumers
Policy makers
Master Gardeners
End uses
Academic colleagues
Students
K-12 educators
Pesticide applicators
Homeowners

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual	0	0	0	0

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

Year: 2009
Plan:
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan			
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- This is a new Planned Program for Virginia. We are only reporting on unplanned state defined outputs this year.
  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	Develop community programs that address hunger in communities
2	Increase the number of Family Nutrition Program participants that adopt behaviors that combats hunger
3	Increase the number of school systems that purchase food from local producers
4	Increase the number of adult participants who report that they ran out of food less often after participating in FNP.
5	Number of community gardening programs implemented to address food insecurity/hunger issues

Outcome #1

1. Outcome Measures

Develop community programs that address hunger in communities

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to the U.S. Department of Agriculture, one in ten households in the United States experiences hunger or the risk of hunger. Many frequently skip meals or eat too little, sometimes going without food for an entire day. Over 203,000 people are at risk of hunger in Northern Virginia. (This includes Alexandria City, Arlington, Falls Church City, Fairfax County, Manassas City and Prince William County.) (U.S. Census, 2000) In Northern Virginia (Alexandria City, Arlington, Falls Church City, Fairfax County, Manassas City, Prince William County), 1 in 6 children is at risk of or experiencing hunger. (U.S. Census, 2000) In the past year, the demand for hunger assistance has increased and research shows that hundreds of hungry children and adults are turned away from food banks each year because of lack of resources.

What has been done
Master Gardener Volunteers in Prince William played an instrumental role providing fresh produce to local food banks through the Plant a Row program. Master Gardener volunteers collected fresh produce, eggs, meats, pastries and coffee from local Farmer's Markets on Thursday, Saturday and Sundays throughout the growing season. After the Farmer's Market pick up, the produce was delivered to the SERVE Food Closet in Manassas and to ACTS Food Pantry in Dumfries. Both SERVE and ACTS provide emergency food assistance for the local community.

Results
Thirty Master Gardeners volunteered 702 hours for the season, making over 2018 contacts. Master Gardener Volunteers collected over 96,330 pounds of fresh produce from vendors at the Manassas City and the Dale City Farmer's Markets. The equivalent value of this produce for Farmer's/Marketer's who receive a tax deduction for their donations, based on receiving $1.60 per pound, equals a total of $154,128.

4. Associated Knowledge Areas

KA Code	Knowledge Area
704	Nutrition and Hunger in the Population

Outcome #2

1. Outcome Measures

Increase the number of Family Nutrition Program participants that adopt behaviors that combats hunger

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Food Research and Action Center (FRAC) reports that 22.5% of children are growing up in homes where food is not available to meet basic nutritional needs. As a result, children are growth impaired and do not develop to their full potential academically and physically. Particularly troubling is the impact on pregnant teenage moms and their babies that results from food insecurity.

What has been done
FNP uses a core lesson series that includes the following: menu planning, preparing meals at home, food buying, food safety and storage. Messages included in these lessons are buying locally grown foods and encouraging gardening and appropriate food preservation as well as raising awareness of community resources to meet food security needs.

Results
Of the participants in EFNEP educational programs:
76% improved at least one food resource management practice by the completion of the lesson series.(planning meals, compares prices, does not run out of food and uses grocery list)
There was also a 41% decrease in families that ran out of food by the end of the month.
Of the participants in SNAP-Ed programs:
81% improved at least one food resource management practice by the completion of the lesson series.(planning meals, compares prices, does not run out of food and uses grocery list)
There was also a 33% decrease in families that ran out of food by the end of the month.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #3

1. Outcome Measures

Increase the number of school systems that purchase food from local producers

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Agriculture is Virginia's largest industry with an annual economic impact of $55 billion. And yet, Virginia farmers are struggling with economic profitability, uncertainty and viability. At the same time, individuals and Virginia communities are experiencing increased incidences of obesity, diabetes, diet-related diseases and in some instances, food insecurity. Expanding good, local fresh healthy food opportunities throughout Virginia's food system can improve agricultural economic vitality and strengthen community health and well-being. Economic data and projections that Virginia Cooperative Extension (VCE) developed in 2007 show that if each household in Virginia were to spend $10 per week for a year on local Virginia products, a significant economic impact would be generated. At a state level, this spending pattern would generate over $1.65 billion dollars in direct economic impact.

What has been done
VCE has been actively leading, assisting and educating Virginians on the role and importance of community-based food systems to local agriculture, local economies, and local communities. In March, April and November 2009, VCE led a collaboration to complete two two-day workshops attracting over 200 individuals on food entrepreneurship and business development for Virginia's local agriculture and value-added food producers. In September 2009, VCE collaborated to host a sustainability summit attracting over 130 individuals, providing practical information about how to strengthen the connection between Virginia's schools, colleges, universities, hospitals and our local food growers and producers.
During 2009, VCE made presentations about the opportunity to develop sustainable, local and regional food systems at statewide conferences such as the Forum for Rural Innovation and Virginia Rural Planning Caucus Annual Meeting, regional conferences such as the Northern District Master Food Volunteer Training, and countless local meetings with agriculture, economic development and other community groups. VCE also published two articles in the Farm Business Management Newsletter educating VCE faculty about local and regional food system trends and opportunities.

Results
VCE faculty are actively leading and participating in the Virginia Food Systems Council and Virginia Farm-to-School Work Group. Through these efforts, VCE was instrumental in the formation and coordination of the first Virginia Farm-to-School Week where 30 school divisions purchased local foods for their cafeterias.

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices

Outcome #4

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	2051

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Food Research and Action Center (FRAC) reports that 22.5% of children are growing up in homes where food is not available to meet basic nutritional needs. As a result, children are growth impaired and do not develop to their full potential academically and physically. Particularly troubling is the impact on pregnant teenage moms and their babies that results from food insecurity.

What has been done
FNP which includes the EFNEP and SNAP-Ed programs uses a core lesson series that includes the following: menu planning, preparing meals at home, food buying, food safety and storage. Messages included in these lessons are buying locally grown foods and encouraging gardening and appropriate food preservation as well as raising awareness of community resources to meet food security needs.

Results
Of the participants in EFNEP program:
76% (1207 of 1589 participants) improved at least one food resource management practice by the completion of the lesson series (planning meals, compares prices, does not run out of food and uses grocery list). There was also a 41% (650 of 1589 participants) decrease in families that ran out of food by the end of the month.

Of the participants in SNAP-Ed programs:
81% (3599 of 4444 participants) improved at least one food resource management practice by the completion of the lesson series (planning meals, compares prices, does not run out of food and uses grocery list). There was also a 33% (1401 of 4346 participants) decrease in families that ran out of food by the end of the month.

4. Associated Knowledge Areas

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

Outcome #5

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	Quantitative Target	Actual
2009	{No Data Entered}	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to a 2009 U.S. Department of Agriculture report, 14.6% of U.S. households were food insecure at least some time during 2008. Food insecurity rates were at their highest levels since 1995. Food insecurity typically translates into diet patterns that are low in vitamins, minerals, fruits, and vegetables. Access to high quality fresh produce by lower income families is limited at best.

What has been done
FCS, 4-H, and Agriculture agents across the Commonwealth partnered with a host of groups, including local Head Start programs, schools, faith-based organizations, and many others to start community and school gardens. The goals for the garden project overall are two-fold. The learning and behavior change objectives include teaching individuals and families how to garden. There is also a goal for alleviating food insecurity by providing the food that is grown is to families in facing or at risk of hunger issues.

Results
Ten gardening programs that address hunger issues were offered in 2009. One of the garden projects took place in Lee County, which has one the lowest per capita income rates in the state. Four hundred families participated in this garden program and a local church provided land for gardening and seven hundred pounds of potatoes were planted and yielded 700 bushels. In a suburban county (Henrico), the Gardens Growing Families Lakeside Garden helped 92% of gardeners save money at the grocery store by growing their own fruits and vegetables. In one urban location (Norfolk), over 561 pounds of produce was harvested and sent to the local food back for distribution. And in Suffolk, another rural area, 1550 pounds of produce was contributed to local Food Banks and Church Kitchens to help feed the Hungry.

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

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

Brief Explanation

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study

Evaluation Results

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
201	Plant Genome, Genetics, and Genetic Mechanisms	20%	25%	20%	0%
402	Engineering Systems and Equipment	20%	25%	20%	0%
403	Waste Disposal, Recycling, and Reuse	20%	25%	20%	0%
511	New and Improved Non-Food Products and Processes	20%	25%	20%	0%
610	Domestic Policy Analysis	20%	0%	20%	0%
	Total	100%	100%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Actual	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research and extension programming that educates and explores issues related to renewable energy systems, energy efficiency, 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 includes laboratory research, development of pilot scale projects in the field, educating clientele on the merits of particular energy practices and conversion technologies, and engaging the private sector to spur the commercialization and economic development of innovative and

efficient energy systems.

2. Brief description of the target audience

Commercial Producers
4-H Youth
K-12 Youth
State and Federal Agency Personnel
Extension Educators
Policy Makers
Consumers

V(E). Planned Program (Outputs)

1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual	0	0	0	0

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

Year: 2009
Plan:
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2009	Extension	Research	Total
Plan			
Actual	40	42	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- This is a new Planned Program for Virginia. We are only reporting on unplanned state defined outputs this year.
  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	Improve the Biomass Yield and Feedstock Quality of Switchgrass
2	Improve the Process Development for Recombinant Protein Recovery from Transgenic Plants and Protein Engineering
3	Develop a Stable Fast Pyrolysis Bio-oil
4	Enhancing Anaerobic Bacteria for the Production of Biofuels
5	Improve Citizen's Knowledge of Bioenergy Processes and Production.
6	Enhance Teacher's Knowledge of Coal, the Energy Industry, Environmental Issues, and Electricity Generation
7	The Urban Tree Canopy Project
8	Improving Varieties of Barley for Use as Bioenergy Feedstock
9	Exploring Basic Plant Biology to Enhance Oil Yield
10	Researching Biological Nitrogen-Fixation to Minimize Energy Intensivity of Agriculture Production Systems
11	Assessing Feasibility of Poultry Litter Biogas Production
12	Designing an Unroller-Chopper for Size Reduction of Round Bales for Efficient Feedstock Processing at Bioenergy Facilities
13	Exploring Wind Energy Applications in Virginia
14	Exploring Opportunities to Animal Waste to Bioenergy
15	Inventorying Residual Biomass to Identify Opportunities for New Revenue Streams in the Commonwealth.
16	Crash Course on the Feasibility of Canola Production for Biodiesel for Carroll, Grayson and Patrick Counties
17	Bioenergy Policies: Consequences for Virginia and the Mid-Atlantic
18	Energy Conservation Measures for Virginia Farms

19	Saving Money by Saving Energy
20	4-H Offers 21st Century Science to Students in King William and King & Queen Counties
21	4-H After-School Clubs
22	Pulaski County 4-H In-School Club Enrichment
23	Building America's Future Engineers through 4-H LEGO Robotics Camp
24	Junior Space Explorers: Increasing Science, Technology, Engineering and Mathematics
25	Commercialization of barley bioprocessing for ethanol production

Outcome #1

1. Outcome Measures

Improve the Biomass Yield and Feedstock Quality of Switchgrass

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Switchgrass is considered a prime candidate for large-scale biomass production for ligno-cellulose derived bio-energy. However the biomass yield and feedstock quality are still need to be further improved through breeding and genetic transformation strategies. Breeding efforts targeting the improvement of switchgrass biomass in the U.S. are very recent. The development of high-yielding modern switchgrass cultivars is just started. Developing switchgrass cultivars suitable for large-scale biomass production in Virginia could also help the state's tobacco farmers to convert to switchgrass production, and therefore contribute to the biofuel pool. This will positively impact the state's economy in the future. Currently, no switchgrass cultivars/lines have been specifically developed for large-scale biomass production in Virginia. Therefore, our long-term goal is to develop switchgrass lines suitable for large-scale and sustainable biomass production in Virginia.

What has been done

A switchgrass breeding program was initiated at VT in 2007. More than 2000 switchgrass plants representing 168 core germplasm have been collected across the country. By selection and characterization of all switchgrass germplasm, we identified a new switchgrass line that is more amendable for genetic transformation. A new switchgrass transformation protocol has been successfully established in our lab. Another new switchgrass line with exceptional biomass yield was generated by tissue culture and chemical mutagenesis. I filed a patent protection on this new switchgrass line.

Results
In collaboration with researchers of Department of biological Engineering, we transformed several genes in switchgrass. One gene can improve the feedstock quality by reducing the overall lignin content of biomass feedstock. Another trans-gene could improve both the switchgrass plant architecture and the water-use efficiency, which will increase the overall biomass yield of switchgrass when it is grown on marginal lands.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Improve the Process Development for Recombinant Protein Recovery from Transgenic Plants and Protein Engineering

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Plant-made-pharmaceuticals (PMP) hold enormous promises in improving human health primarily due to its ability of producing large quantity of a target protein at low cost. However, recombinant proteins are typically expressed at a relatively low level, only accounts for about 2% of the weight of the biomass, and the most daunting engineering challenge for PMP is to efficiently remove all plant related impurities while recover the recombinant protein and to further purify it to homogeneity suitable for human injection. Thus, technologies are needed to recover and purify the valuable recombinant proteins from large quantities of biomass, particularly those technologies that are economical and can be scaled up readily. On the other hand, how to improve the performance of cellulosic enzymes at elevated temperature has been a pressing subject for the bioenergy industry. Increase the operational temperature of those enzymes will have a significant impact on the economics of biofeul. The Virginia Tech College of Agriculture and Life Sciences has an established center in Biodesign and Bioprocessing.

What has been done
In 2009, Dr. Zhang's lab investigated different technologies that can be used in protein recovery and purification from transgenic plants. The common characteristics of these technologies are that they are economical, readily

scalable, and subjected to engineering development. For protein engineering, we integrated protein molecular modeling and site-directed mutagenesis to generate protein variants to study how we can stabilize enzymes at elevated temperatures.

Results
In 2009, we focused on the following two technologies for protein recovery and purification, aqueous two-phase extraction and Protein A affinity chromatography. By screening various engineering parameters, we have successfully developed the aqueous two phase extraction for the purification of a model protein, beta-glucuronidase, from transgenic tobacco. We also studied how non-specific interactions from native tobacco proteins can affect the performance of the Protein A affinity chromatography in the purification of antibodies from tobacco. For protein engineering, with the assistance of protein molecular modeling, we have successfully increased the operational temperature of a cellulosic enzyme. The development of protein purification process and protein engineering will have impact in both biopharmaceutical and industrial enzyme industries.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Develop a Stable Fast Pyrolysis Bio-oil

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Bio-oil from fast pyrolysis biomass has a great potential to be used as fuel oil in industry, or as transport fuel. While one of the major problems for the utilization of bio-oil is that the poor storage stability of bio-oil due to the complex mixture of reactive oxygenation compounds. The high acidity also contributes to the corrosivity of the oils.

What has been done
Our research screened catalysts to eliminate the acidic or oxygen-containing substituents in the bio-oil chemical mix. The other option is to retrofit the current one-stage reactor into a two-stage fluidized bed reactor to improve the performance of the catalyst and therefore, improve the stability of the oil.

Results
The research showed that some of the catalysts were able to knock out most of the acidic or oxygen-containing compounds and decrease the acidity of bio-oil. Hence much more stable bio-oil from fast pyrolysis of biomass can be obtained.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Enhancing Anaerobic Bacteria for the Production of Biofuels

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Organic commodity chemicals are basic materials for the manufacturing of a wide variety of industrial and consumer goods. Most organic commodity chemicals are presently produced from crude oil and natural gas. Coupled with its role in the production of fuels, crude oil is a critical raw material. Since the 1970s, the escalating price and the fluctuating supply of crude oil have threatened the economy and security of all oil-importing nations. Among these commodity chemicals, many can be produced from short-chain alcohols, including ethanol, isopropanol, and butanol. Production of these alcohols from biomass can lessen the dependence on crude oil.

What has been done
Alcohols are energy-rich molecules. They are produced by some bacteria and yeasts when these microbes do not digest their foods all the way to carbon dioxide and water, and this can only happen when they grow in an oxygen-free, or anaerobic, environment. These alcohol-producing microbes are therefore anaerobic organisms. For several decades, anaerobic bacteria within the genus Clostridium were used in the production of butanol, acetone, and isopropanol (collectively known as solvents) from corn, molasses, and other biomass. This established industrial fermentation was handicapped, however, by a relatively low final solvent concentration, the frequent deterioration of the production strains, and a limited production period because these organisms have a tightly controlled program that turns on and off the cellular machinery for solvent production. The goals of this project are to characterize and manipulate the genes, their control elements, and the growth conditions so that one may alleviate some of the limitations for the production of butanol.

Results
This research program focuses on the characterization of the butanol-producing bacteria. There are four known species of butanol-producing bacteria, and Clostridium beijerinckii was more widely used than the others in past industrial production. We characterized the enzymes that are required for the production of butanol and isopropanol by Clostridium beijerinckii. Using the molecular properties of these enzymes as a guide, we cloned the genes that code for these enzymes, and the sequence and the organization of these genes were then determined. The control elements for these genes are the target of our current research on strain improvement. As the sequence of the genome of one strain of Clostridium beijerinckii is now available, we can examine the control elements of many gene groups to gain insights into the control mechanism for the butanol-production

genes. We previously established a procedure for introducing engineered genes back into the organism to improve its butanol production. We have altered the control element for the butanol-producing genes to prolong the period of butanol production. The emphasis of our current research is to translate our basic knowledge into the development of practically useful processes.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Improve Citizen's Knowledge of Bioenergy Processes and Production.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	1

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 fossil fuels and are troubled by the impacts that this dependence has created at home. In response to these issues the federal government passed the Renewable Fuels, Consumer Protection, and Energy Efficiency Act of 2007. This energy act seeks to move the United States toward greater energy independence and security, and promote the production of renewable fuels. This law received considerable attention in the summer of 2009 when oil topped $78 a barrel, gasoline was near $2.65/gallon, and livestock/poultry industries were challenged by record 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.

What has been done
In 2006, 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 2009, the materials from the BEEP program were presented to different and diverse audiences through presentations and field tours. Last year the BEEP program focused primarily on anaerobic digestion and

small scale biodiesel production. These sessions were targeted to community leaders, entrepreneurs, farmers, 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.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Enhance Teacher's Knowledge of Coal, the Energy Industry, Environmental Issues, and Electricity Generation

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to the Energy Information Administration, coal provides approximately 46% of Virginia's electricity and over 50% of the nation's electricity. According the National Mining Association, Virginia is ranked 11th in the United States for coal production making it a major contributor to Virginia's economy. Virginia has seen dramatic increases in electricity consumption over the last 10 years meaning having a constant source of energy is critical. Coal is not only used for electricity, but also steel, paint, shampoo, Tylenol, and even imitation vanilla flavoring. Understand principal of electricity generation, the importance of coal, coal production, environmental issues associated with coal, and new energy technologies are critical to our youth. In addition, several Virginia Standards of Learning focus on these exact issues. However, many teachers do not have training or materials in this area meaning it is often not taught to the extent necessary.

What has been done
To enhance teacher's knowledge of coal, the energy industry, environmental issues, and electricity generation, the Powell River Project Research and Education Center and Wise County Extension along with the Eastern Coal Council hosted a week long program on these subjects in the coalfields of Virginia. Participants explored the Powell River Project Research and Education Center and saw how mined land has been restored for a variety of post-mining land use options. They also visited a vineyard on restored mined land, underground mines (longwall and continuous mining operations), a surface mine, a coal preparation plant, and a coal-fired power plant. They also listened to various speakers within the industry and government agencies. Thirteen teachers participated in the 2009 program from across the state.

Results
At the conclusion, the teachers filled out an evaluation of the program. Majority of the teachers said that they would recommend this program to other teachers and rated the most field trips as "Excellent" and speakers as

"Good" and "Excellent". All teachers believed that this program would help them "To a Great Extent" teach their students the impacts that coal has on Virginia economy and coal's industry future impact on Virginia. All teachers said in terms of adapting lesson plans that they would "often when the subject correlated to coal and energy". When asked about using new material to create new lessons they said that they would "often and more time would be spent on coal and energy related SOLS". Teachers also commented that they would utilize more show and tell materials, spend more time going over energy resources, and sharing knowledge with other teachers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
610	Domestic Policy Analysis

Outcome #7

1. Outcome Measures

The Urban Tree Canopy Project

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Urban Tree Canopy Project is a partnership between the Chesapeake Bay Program, the Virginia Department of Forestry (VDOF), the Virginia Geospatial Extension Program (VGEP) at Virginia Tech, and the localities participating in the project. The goal of the project is to assist partnering localities by providing them with the tools and technical infrastructure to assess urban tree canopy coverage using remote sensed multispectral imagery. Once a baseline of urban tree canopy is established, the program will further work with each of the respective localities to support efforts to maintain or increase urban tree canopy coverage.

What has been done
This program has provided UTC estimates for eight communities (Charlottesville, Lexington, Lynchburg, Winchester, Manassas, Roanoke City, Salem, Vinton, and urbanized areas of Roanoke county) through the spring of 2009. This area covers approximately 130 square miles. Metrics are generated for each locality. These metrics provide jurisdictional level canopy and land cover information, and identifies specific parcels where jurisdictions

can target additional canopy cover.

Results
The impacts can be quantified, and will be long term. Fairfax County, Virginia estimates that urban trees provide the following ecosystem benefits:

* $261/acre annually in air pollution benefits;
* $5-57 annually for carbon uptake;
* $231/acre each year in energy conservation; and more than
* $25,000/acre in storm water management benefits.

In ensuing years, the program will assess the changes in UTC for participating communities, and provide estimates of the economic benefits for each community.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment

Outcome #8

1. Outcome Measures

Improving Varieties of Barley for Use as Bioenergy Feedstock

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As a result of research being conducted by Virginia Tech's plant breeders and extension specialists and the USDA Eastern Regional Research Center located in Wyndmoor, Pa., barley is being considered a promising ethanol feedstock.

What has been done
Through this collaboration, improved hulled and hulless barley varieties are being developed which make barley a suitable feedstock for ethanol production. The new varieties have a heavier test weight and higher starch content, which are more desirable. The hulless varieties show added benefits as the undesirable hulls are loosely attached and easily removed during harvest.

Results
Osage Bio Energy in Hopewell, Va. will utilize barley as its primary feedstock in its $160 million Appomattox Bio

Energy facility, the first major barley-to-ethanol bioprocessing facility in the United States, scheduled to open in 2010. The facility will process more than 30 million bushels of barley annually to produce more than 65 million gallons of ethanol. The plant is expected to bring about 50 fulltime jobs and generate $2 million tax revenue annually.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Exploring Basic Plant Biology to Enhance Oil Yield

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	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 19 billion 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 450 million gallons of biodiesel, worth about $1.5 billion. 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 2009, Collakova's "Seed Metabolic Regulation" lab was launched at the Department of Plant Pathology, Physiology, and Weed Science (PPWS) at Virginia Tech. The current goal is to develop a basic research program 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 will initially differentiate major pathways leading to oil and protein synthesis and investigate what determines when oil versus protein is made. Two NSF and a number of local grant proposals were submitted to launch this project. Start-up funds are used for work in Arabidopsis, while internal Bioprocess and Bioengineering seed funds ($52K) are used for the sub-project titled 'Developing Platforms for Seed Metabolic Engineering in Soybean'.

Results
Arabidopsis seeds accumulate up to 40% of oil and 40% of 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 MFA and use of mutants allow determine how these metabolites are formed by quantifying flow of carbon through the pathways in metabolic network. Developing Arabidopsis seeds prefer to take carbon and nutrients from the plant over performing their own photosynthesis as they produce carbon dioxide rather than fix it. Our results also indicate that most carbon for oil synthesis comes from glycolysis in the cytosol and to some extent plastidic glycolysis in developing Arabidopsis seeds. Eliminating one of the plastidic glycolytic enzymes had very little effect on oil accumulation and re-direction of fluxes from plastidic to cytosolic glycolysis was observed. In canola and soybean, amino acids like glutamine can also feed directly to plastidic and cytosolic glycolysis and subsequently to fatty acids. Labeling experiments with [U-13C5]-Gln revealed that glutamine carbons, while being incorporated into some amino acids, are not used at all in oil synthesis. Our results indicate that there are differences in seed metabolism among different plant species and that multiple regulatory mechanisms are in place and carbon from one pathway can be re-directed into another pathway. These encouraging results indicate that we can use carbon in seed metabolism to make a desired product, but at the same time there will be very little success without knowing the regulatory mechanisms that allow this metabolic plasticity.

4. Associated Knowledge Areas

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

Outcome #10

1. Outcome Measures

Researching Biological Nitrogen-Fixation to Minimize Energy Intensivity of Agriculture Production Systems

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Fundamental understanding is sought so that the process of biological nitrogen-fixation process may be incorporated into crops that presently cannot perform it. Because this process depends only on readily renewable resources (sunlight, nitrogen gas, and water), it should become a significant component of sustainable agriculture. Currently, fixed nitrogen, usually provided as urea, ammonia, or nitrate in commercial fertilizers, is most often the limiting factor and certainly the most-energy intensive component in US agriculture. In Virginia alone, total annual

fertilizer costs (more than $100 million) account for about 50 percent of farm expenses to produce food and feed, with fixed-nitrogen fertilizers accounting for about 65 percent of these costs. Thus, alternatives to commercial nitrogen fertilizers could produce considerable financial as well as energy savings, while also decreasing the negative environmental impacts, such as ground and surface water contamination, of fertilizer use.

What has been done
We have focused on how the natural catalyst, an enzyme called nitrogenase, for making ammonia works. The agricultural significance of the microbes, which deliver fixed-nitrogen to certain crops, is well established and real prospects exist for improving microbial nitrogen fixation. However, such improvements are dependent upon acquiring a fundamental understanding of how nitrogenase works.

Results
We are investigating how nitrogen gas (N2) and related small molecules (like carbon monoxide, CO) interact with this enzyme and how this interaction is affected by introduced changes in the enzyme's composition. We have found candidate locations for these interactions and on-going efforts are targeting these sites in detail. As we close in on solving the mechanism of N2 reduction, many details remain to be understood. We are certain that our efforts will generate targets for how this enzyme and process might be manipulated for future agricultural benefit.

4. Associated Knowledge Areas

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

Outcome #11

1. Outcome Measures

Assessing Feasibility of Poultry Litter Biogas Production

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The growing concern over the phosphorus and nitrate pollution infiltrating the Chesapeake Bay has put growing pressure on the Dept. Of Environmental Quality to increase the regulations regarding the land application of poultry litter. Poultry production is the largest source of agricultural revenue in Cumberland County. Regulations that impact litter application through nutrient management plans, directly affect the livelihood of the poultry producers.

What has been done

A group of poultry producers with the help of Va. Farm Bureau, and with the support of the Board of Supervisors and Va. Cooperative Extension formed a committee to explore the feasibility of building an anaerobic digester to convert poultry litter into methane to power a generator to produce electrical power. The by-products would be a high quality liquid and dry fertilizer and compost. In addition, carbon credits would be produced which could be sold on the international market.

Results
A $37,000 feasibility grant was obtained from the US Dept. of Agriculture to design and engineer plans for the project. A feasibility study has been performed and a business model is in the draft stage. Legal counsel has been sought to address the process for incorporation. Meetings will soon be held with the growers to seek contracts to obtain litter for the project. Future plans will address funding for the project.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse

Outcome #12

1. Outcome Measures

Designing an Unroller-Chopper for Size Reduction of Round Bales for Efficient Feedstock Processing at Bioenergy Facilities

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The round bale is the best technology for the harvesting of switchgrass for bioenergy in Virginia. This technology is ideally suited for the small irregular-shaped fields on rolling terrain found in South Central Virginia. It provides the best opportunity for Virginia to compete for a bioenergy plant.

What has been done
Investors in a bioenergy plant need a receiving facility that can receive round bales, unroll them, and chop the resulting stream of material into small particles. The goal is to develop a machine that can process 30 ton/h using less than 200 hp.

Results
Significant progress has been made. Round bales can be successfully unrolled until the diameter is less than 20 in. The resulting core is a ""slug"" of material that jams the chopper. A set of rotating knives have been built to cut the core into sections that feed satisfactorily into the chopper.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment

Outcome #13

1. Outcome Measures

Exploring Wind Energy Applications in Virginia

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virginia's food producers and processors continue to be affected greatly by the increase in energy costs due to the fluctuation in oil prices. In some areas of the state the charges for electrical energy have increased by 150 percent within the last two years.

What has been done
Developing a model program for alternative wind use in collaboration with a fish farm on in Quinby, VA

Results

The fish farm has received information for energy savings for electrical and propane applications, continues to receive wind energy generation data from a state funded anemometer to determine the economic viability of using wind generation and participated in a free state-funded energy audit. With my guidance and the data from the state energy audit, the farm manager was able to determine the heat and electrical operational needs to fill out requests from Virginia's Department of Mines and Minerals requesting a review for solar energy and heating reservation in the amount of 67KW. This reservation allows the fish farm manager to take bids to install a 67 KW solar heating and energy system which will be sent back to the state in the form of a grant requesting money for the purchase system. The 67 KW is the amount of energy necessary to heat water and provide energy for the facilities operation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment

Outcome #14

1. Outcome Measures

Exploring Opportunities to Animal Waste to Bioenergy

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	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 $7 million in funding for research, outreach, and pilot projects since 2005.

What has been done
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.

Results
A variety of pilot projects, programs and research collaborations have resulted via the Waste Solutions Forum.

4. Associated Knowledge Areas

KA Code	Knowledge Area

402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
610	Domestic Policy Analysis

Outcome #15

1. Outcome Measures

Inventorying Residual Biomass to Identify Opportunities for New Revenue Streams in the Commonwealth.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Due to rising energy prices, climate change, and 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 recently 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 2007 Virginia Energy Plan a nonbinding goal of reducing statewide carbon dioxide emissions 30% by the year 2025. 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.

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 complete a residual biomass inventory for the Commonwealth of Virginia.

Results
The statewide assessment work is completed and results from this survey are being incorporated into the final 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 will be released in 2010 as a text report and as a queryable online geographic information system both formats 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
610	Domestic Policy Analysis

Outcome #16

1. Outcome Measures

Crash Course on the Feasibility of Canola Production for Biodiesel for Carroll, Grayson and Patrick Counties

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In 2008 a Canola Biodiesel plant was built forty-five minutes east of Carroll Co. A small group of forward looking agricultural producers requested a "Crash Course on the Feasibility of Canola Production for Biodiesel". During 2008 crude oil prices reached record levels of $150/barrel and $4/gallon gasoline in the U.S. served as a major contributor to the worst economic recession in the world since the Great Depression.

ANR Agents from Carroll, Grayson and Patrick Cos. met with Economic Development officials to develop topics to be considered. The itinerary for the course was agreed upon:

*Canola for Bio Diesel

*Canola Production and Test Plots in Central VA
*Land Suitability/Availability
*Canola Agronomics and Production Specifics
*Farm Production Budgets and Local Economic Feasibility
*Local Farm Organization for Planting/Harvesting/Mktg
*Markets for Canola and Canola By-Products

The course was attended by producers, NRCS staff, local economic development officials and extension agents.

What has been done
The course brought years of science and working knowledge to innovative producers in the three county area. The course was conducted in discussion format and participants and presenters were very engaged while topics were presented. Participants learned broad, detailed knowledge on: 1) how canola works well as an excellent oil source for biodiesel, 2) results from on farm test demonstrations carried out in central VA by farmers and extension agents in the previous years, 3) soil types and topography needed for canola production, 4) cultural practices and variety selection for growing canola in VA, 5) local canola enterprise budget analysis, 6) challenges with planting, harvesting and transporting canola, and 7) current markets for canola in VA. As the day progressed, producers, extension agents, NRCS staff, economic development officials and presenters recorded positive and negative attributes of canola production.

Positive Attributes:

*Canola is a crop that can successfully be grown most years in SW, VA

*Excellent canola yields have been obtained fairly consistently in VA

*VSU and V Tech researchers invested in canola production practices and variety development/trials

*Canola can serve as a cover crop

*Canola is an excellent crop for Biodiesel, with much higher energy and oil content than soybeans

*The biodiesel plant in Henry Co. offers annual contracts for producers to grow canola

*Recent contract prices afford canola production to be economically viable

*There is high demand for canola biodiesel by-product feed-stuff for dairies

*Soil types in the area work well for canola

Negative Attributes:

*Currently the Henry Co. biodiesel plant is the only canola market in Virginia

*Transportation for harvest and shipment on mountain farm roads and highways can be challenging

*Harvest equipment and storage bins are non existent in the area

*Canola growing season in mountains is relatively tight for existing varieties

*Due to canola and cabbage being in the same brassica family, they should not be double cropped

*Average field size in area is relatively small for crop production that typically requires significant equipment investment.

Results
The biodiesel plant in Henry Co. is experiencing financial success in the renewable green energy economy. Canola biodiesel is an energy efficient utilization of a crop to offset the utilization of fossil fuel for transportation. As negative barriers are diminished and demand increases, canola production has tremendous financial and societal potential. Participants agreed that canola production in VA can become viable. Grayson Co. is in the process of revisiting canola production for biodiesel utilization.

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

Bioenergy Policies: Consequences for Virginia and the Mid-Atlantic

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As many states develop renewable energy portfolios, the profit potential for bioenergy is likely to grow. Although biofuels and bioenergy production is growing in the U.S., Virginia and the Mid-Atlantic region have seen no functioning commercial-scale bioenergy projects to date. Critical economic and environmental implications of bioenergy production in Virginia must be defined for citizens, producers, and policymakers so that investments reflect the best private and social allocation of resources.

What has been done
Continuing analysis is being conducted as economic and policy circumstances change. Presentations have been made to farmer, general public, public agency personnel, and academic audiences in local and regional forums.

Results
Citizens who received this information now understand the complexities of bioenergy system development, the policy incentives that exist or may be initiated, and environmental consequences of bioenergy developments.

4. Associated Knowledge Areas

KA Code	Knowledge Area
610	Domestic Policy Analysis

Outcome #18

1. Outcome Measures

Energy Conservation Measures for Virginia Farms

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	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. In 2007, farms in Southside and Southwest Virginia generated over $849 million in total sales representing a significant source of revenue for these rural communities and spent over $58 million in fuel and $16 million in electricity and other utilities, spending nearly $75 million in total. Understanding and implementing energy efficiency practices and technologies are key to managing soaring energy costs related to agricultural operations such as dairy, poultry, and flue-cured tobacco production. Farmers must increase production while minimizing energy inputs.

What has been done
To progressively address these issues, Virginia Cooperative Extension and its partners held two (2) full day conferences on energy management (2009 Managing Energy on Virginia Farms and Tobacco Curing Energy Efficiency Conference) and sponsored one (1) field day (Tobacco Curing Energy Efficiency Field Day) on a Mecklenburg tobacco farm. Both conferences and the field day offered participants the opportunity to a) gain practical advice for electricity and fuel cost savings, b) understand options for managing and reducing energy use on farms using energy efficiency technologies and practices, and c) define on-farm energy saving strategies, substantial energy improvement options, and financing upgrades and equipment change outs.

Results
A total of 141 individuals (with over 80 individuals representing agricultural operations, agencies, and Extension) participated in the two conferences and 61 attended the flue-curing tobacco field day. Participants commented that they gained more information than they had expected, better understood the issues facing local farms, and would implement many of the energy conservation recommendations. In addition, one participant is investigating the possibility of becoming an energy auditor and is working with one of the speakers to pursue this initiative. Overall, the evaluations summary indicated that the programs were timely and participants gained knowledge.

Based on the work of these three programs and the identified needs of regional agricultural operations, Virginia Cooperative Extension submitted a grant proposal to the Virginia Tobacco Community Revitalization and Indemnification Commission to fund a two-year project focused on training farm energy auditors, conducting energy audits, and implementing energy improvements and conservation practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment

Outcome #19

1. Outcome Measures

Saving Money by Saving Energy

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to the U.S. Department of Energy the typical U.S. family spends about $1,900 a year on home utility bills? Unfortunately, a large portion of that energy is wasted. Particularly during an economic downturn, families need to spend as wisely as possible in every area of their budgets.

What has been done
A workshop called, ""Save Energy, Save Money,"" enabled families to learn energy management best practices to save energy and reduce the amount they spend on utilities. Concepts taught included keeping equipment clean, insulating adequately, reducing hot water heater temperature, using compact fluorescent bulbs, and unplugging equipment when not in use, among others.

Results
Of the 96 participants, 73 completed the end-of-session evaluation form. Of these, 72 (96%) indicated that because of the program they know more about ways to save money by saving energy. Participants were asked to indicate things they planned to do differently as a result of the program. Before the program, only 10 (13%) of the participants had conducted a home energy audit; after the program 46 (61%) planned to conduct a home energy audit. Before the program, only 22 (29%) of the participants turned off and unplugged equipment when not in use to avoid "phantom load"; while after the program 53 (71%) planned to do so. Before the program, only 33 (44%) of the participants had their water heater temperature reduced to 120 degrees; after the program, 62 (83%) planned to set their hot water heater at 120 degrees. A follow-up evaluation of the program is currently in progress."

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment

Outcome #20

1. Outcome Measures

4-H Offers 21st Century Science to Students in King William and King & Queen Counties

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Studies have shown and teachers have expressed to the Extension Agent that they are reluctant to teach basic science due to their lack of scientific knowledge. In addition to being unsure of topics such as plants, animals, ecology, and electricity which are basic science; teachers often feel completely at a loss with more recent scientific developments in the field of science. The National 4-H Science, Engineering and Technology (SET) committee states that the "SET program must be part of the long-term solution for improving science literacy and attitude of America's youth".

What has been done
Additional classes, especially those in the areas of technology and engineering, have been added to the offerings to the schools by the 4-H agent. These classes include fields such as alternative energy sources, nano technology, and hydro polymers.

Results
One hundred and sixty-three students in both King William and King & Queen Counties participated in a nationwide experiment by making bio fuel. Fifty King & Queen 6th and 7th grade students conducted experiments that helped them to understand the nano technology. In King William the 4-H agent was recognized as an asset to the school community and asked by the school Superintendent and the Director of Curriculum to become an integral part of a committee to bring engineering classes into the district school program and to develop an after school technology club.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment

Outcome #21

1. Outcome Measures

4-H After-School Clubs

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
After-school programs have sprung up across the United States to address the growing concern that many youth are going home to empty houses which lends for their involvement in unhealthy and risky behaviors.

What has been done
4-H After-School Programs, led by Extension staff and adult volunteers, strongly supported by Pulaski County Public Schools, are taking the initiative to provide programming that will be attractive and inviting to youth of different ages. One program was held at Dublin Middle School. This program had similar format to the In-School Clubs, to include Electric Energy, Rock & Minerals, and Earthquakes & Volcanoes. We also have a 4-H Garden Club at Pulaski Elementary School that meets weekly from October through December and will resume meetings February/March 2010. Planning and programming is under way, for Riverlawn Elementary School to add a Garden Club, Spring 2010. New this year (2009-2010), we added a Junior Master Gardener's Club at Critzer Elementary.

Results
4-H After-School Programs at the Dublin Middle School has been popular due to programming to their interests and needs. Students enjoy making ice-cream while learning the chemistry behind the process. 4-H'ers also enjoyed 4-H Soda Bottle Rockets. We even added Dance Revolution to the program with great response. Dynamic and innovative programming has led to strong involvement in this program which will lend for stronger involvement at the Senior 4-H level in later years.

Eighteen active youth and adults participate in Horticulture and Garden Programs. This program engages the students of Pulaski Elementary School in a ""hands-on inquiry"" gardening project at school. This project serves as a living laboratory for setting up experiments, collecting data, and reporting results, and also cultivates their rural heritage and nurtures appreciation for the wildlife in the community. The project serves the entire student body at Pulaski Elementary School during the school year. Without them really knowing, these hands-on educational experiences are helping students master components of the Virginia Standards of Learning.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment

Outcome #22

1. Outcome Measures

Pulaski County 4-H In-School Club Enrichment

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Teachers struggle to find engaging, hands-on curriculum to meet their needs to help their students master the Virginia Standards of Learning. 4-H In-School Enrichment Clubs help students meet and master the Virginia Standards of Learning (SOL's). Our lessons and activities provided hands-on educational experiences in language arts and science. Furthermore, our programs provided leadership and life-skills (decision making, problem solving) opportunities for many students that prove to be invaluable toward future endeavors.

What has been done
As a result, 37/38 4th and 5th Grade Clubs (776+ students), and 2 High School Clubs (40+ students) participated in the 4-H In-School Program. Fourth grade clubs received programming in Electric Energy while 5th grade clubs received programming in Rocks & Minerals and Earthquakes & Volcanoes. Youth in these clubs also receive programming in Dramatic Reading, Presentations, and Share-the-Fun. Winners from the contest areas participate in 4-H County Contests and the 4-H Area Contest.

Results
One hundred percent of returned 4-H In-School Club Enrichment surveys rated our programs and lessons from excellent to good and appropriate and effective at meeting requirements for the Virginia SOL's. Teachers even feel our programs are key to their students 'Proficient' or 'Advanced Level' SOL's scores. Furthermore, 100% of the returned surveys stated to continue with the same 4-H In-School Club Enrichment programs."

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment

Outcome #23

1. Outcome Measures

Building America's Future Engineers through 4-H LEGO Robotics Camp

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
A 2001 United States Economic Council on Competitiveness study, found that the economy in America is highly dependent on advanced technology and that there are fewer workers entering the science and technology field. 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 American youths with a solid background in science, engineering, and technology. Moreover, 4-H programs get children excited and interested in these fields" (110th Congress: Session 2, September 2008).

What has been done
A two-day residential 4-H LEGO Robotics specialty camp was conducted Airfield 4-H Center in June 2009. The 4-H LEGO Robotics Camp introduced and prepared 33 youth ages 9-13 to LEGO robotics design and programming. 4-H agents, Airfield 4-H Center staff, and 10 volunteers lead workshops in robot design, computer programming, public speaking, teambuilding, character education, alternative energy, and environmental education. At the conclusion of the program campers participated in a mock competition showcasing skills gained in robotics construction, programming, and public speaking.

Results
Written evaluations from 4-H LEGO Robotics campers provided evidence that the event a successful delivery mode to engage youth in science, engineering, and technology (SET) programming. Specifically, 48% of campers reported feeling more comfortable working with SET programs and 68% of campers reported an increased interest in learning about occupations involving SET as a result of participating in the camp. Pre and Post test survey results indicated camper knowledge gain in the following areas: basic parts of a robot, computer programming, and alternative energy. Character development and public speaking skills were also noted as an area of camper and youth development as a result of this program. A significant increase (71% of campers) in knowledge gain regarding the six pillars of character was found. Overall, the 4-H LEGO Robotics Camp was a successful venue for youth to gain knowledge in science, engineering, and technology and personal development. The program will be replicated in 2010.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment

Outcome #24

1. Outcome Measures

Junior Space Explorers: Increasing Science, Technology, Engineering and Mathematics

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
A 2001 United States Economic Council on Competitiveness study, found that the economy in America is highly dependent on advanced technology and that there are fewer workers entering the science and technology field. During the 2005- 2006 Williamsburg/James City County academic year, only 55% of elementary school students

demonstrated proficiency in science. Additionally, only 36% of elementary school students demonstrated proficiency in mathematics.

What has been done

James City County 4-H partnered with James City County Parks and Recreation to offer a specialty aerospace day camp for 9 - 12 year olds over a five day period. The goal of the day camp was to educate youth about the solar system, gravity, rocketry, aeronautics to increase interest in occupations in science, technology engineering, and mathematics. Participants participated in workshop sessions which included model rocketry, healthy snack preparation, solar energy, and egg drop. The program concluded with a trip the Virginia Air and Space Museum.

Results

Thirty-eight youth, 63% male and 36% female, ages 9 - 12 participated in the Junior Space Explorer Day Camp. At the conclusion of the program, participants reported a 68% increase in knowledge related to the size of the planets and 72% of participants correctly identified that salt decreases the melting point of ice. After the completion of the camp, approximately 56% of participants were able to correct label all eight phases of the lunar cycle and 77% percent of participants were able to distinguish the difference between a meteor, meteorite, and meteoroid. Program participants had a 78% positive response in feeling more comfortable with science, engineering, and technology and 72% of program participants reported an interest in learning more about occupations in science, technology, engineering, and mathematics as a result of participating in the program. Additionally, 79% of program participants reported they learned to work well with others at the conclusion of the program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment

Outcome #25

1. Outcome Measures

Commercialization of barley bioprocessing for ethanol production

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual

2009	{No Data Entered}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As a result of research being conducted by Virginia Tech's plant breeders and extension specialists and the USDA Eastern Regional Research Center located in Wyndmoor, Pa., barley is being considered a promising ethanol feedstock.

What has been done
Through this collaboration, improved hulled and hulless barley varieties are being developed which make barley a suitable feedstock for ethanol production. The new varieties have a heavier test weight and higher starch content, which are more desirable. The hulless varieties show added benefits as the undesirable hulls are loosely attached and easily removed during harvest.

Results
Osage Bio Energy in Hopewell, Va. will utilize barley as its primary feedstock in its $160 million Appomattox Bio Energy facility, the first major barley-to-ethanol bioprocessing facility in the United States, scheduled to open in 2010. The facility will process more than 30 million bushels of barley annually to produce more than 65 million gallons of ethanol. The plant is expected to bring about 50 fulltime jobs and generate $2 million tax revenue annually.

4. Associated Knowledge Areas

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

Brief Explanation

Volatile energy prices and the prospect of new carbon policies have heightened awareness of the importance of sustainable energy systems. However, 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.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Other (No systematic evaluation has been completed for this Planned Program (Sustainable Energy) as it is a new program tract.)

Evaluation Results

Key Items of Evaluation