Virginia Tech and Virginia State University
Agricultural Research and Extension
FY 2003 Annual Report of Accomplishments and Results

The following is the Virginia Annual Report of Accomplishments and Results for 2003. The report includes the Agricultural Research and Extension programs at Virginia Tech and Virginia State University.

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A. Introduction

Mission

Virginia Cooperative Extension (VCE) enables people to improve their lives through an educational process that uses scientific knowledge focused on issues and needs.

Vision

Building on the strength of our agriculture, natural resource, family and community heritage, we enable people to shape their futures through research based educational programs. Recognizing that knowledge is power, we serve people where they live and work. Audiences are involved in designing, implementing and evaluating needs-driven programs. We are 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.

Our vision is:

- To help clientele improve their lives.
- To use a systems approach to programming, with task-oriented work teams that respond to the needs of individuals, groups and organizations.
- To provide residents prompt access to information and programs through an innovative human and technological system.
- To work with the disenfranchised and underserved who need special attention by targeting certain of our resources to programs for low-income groups, those outside the dominant culture, dysfunctional families, limited-resource farmers, at-risk youth and others.
- To fully integrate a culturally diverse paid and volunteer staff in planning, implementing and evaluating programs.
- To collaborate with public and private partners to better utilize our resources, heighten our impact and reach a more diverse audience.
- To capitalize on the respective strengths of Virginia State and Virginia Tech as partners in supporting the extension mission.
- To recruit, manage and reward faculty, support, and volunteer staff to reflect each person's uniqueness and value.
- To have an open and positive administrative environment, based on shared leadership that maintains organizational integrity while providing opportunities for all staff members to fully realize their potential.
- To minimize administrative costs and direct our resources to educational programming.

Planning and Reporting Framework

Program Development. 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 Planning and Reporting system, which includes long range goals

operationalized by annual program plans and reports. The foundation upon which program plans are built is the identification of strategic issues through situation analysis, accomplished with the help of local Extension Leadership Councils. Situation analysis is a process of collaboratively determining what problems exist at local, regional, and state levels, and then deciding which ones have become issues of major public concern. This becomes the background and rationale for deciding which problems and issues can be addressed with VCE time, energy, and resources.

Virginia Cooperative Extension's (VCE) program planning and reporting system is web-based and includes goals, educational programs, objectives, strategies, and data and information required for reporting.

VCE Goals. Strategic goals form the foundation upon which educational programs are developed. Goals are determined with the involvement of Extension Leadership Councils, cooperating agencies, local governments, and other partners.

The VCE strategic goals are:

- Virginia's agricultural, forestry, and agribusiness firms will be competitive and profitable.
- Virginia's youth will be educated leaders for the 21st Century.
- Virginia's natural resources will be enhanced.
- Virginians will have a high quality, safe food supply.
- Virginians will enjoy a good quality of life.

Educational Programs. VCE educational program plans serve as a communication and planning tool for developing, delivering, and reporting VCE programs. They are used to communicate information about VCE client-focused programs within the system and to external audiences such as the state and federal government officials.

Once approved, the educational programs are available on the VCE Intranet so all staff may review and respond. Personnel respond ("buy in") to the appropriate educational programs by indicating the programs they plan to deliver. At the end of the programming year, an annual report is prepared for each educational program. In addition, staff are able to amend, or update, their buy-in annually, or as often as needed.

Educational Objectives. Objectives describe the level of change expected in the target audience and/or the problem as a result of implementing the program. The following categories represent four types of change that may occur:

- Reactions - Change in peoples' awareness and response to educational programming and information related to the problem.

- Knowledge or skill (K/S) change - Changes in peoples' knowledge, understanding, or abilities related to the problem.

- Practice change - Changes in peoples' behavior related to the problem.

- End results - Broader change in peoples' situation related to prevention, reduction, or solution of the problem itself.

Reactions, knowledge/skill (K/S), and practice change focus on people. End results can be written for people or problem solution. An objective expecting an end-result is often difficult to achieve in only one year of programming.

Educational Strategies. Educational strategies are the methods used with the target audience(s) to achieve the objective and address the problem. Some examples of strategies include: panels, group discussions, tours, lectures, workshops, seminars, and demonstrations. Educational strategies also include any programming efforts aimed at racial/ethnic groups, women, and/or other previously under-served or under-represented groups specifically targeted for special attention in the program.

Reporting Requirements

Personnel required to submit reports. All Extension faculty (agents, specialists, and administrators), and program assistants must submit individual reports. Also, county/city employees supervised by Cooperative Extension and who conduct Extension programs must submit program reports.

The State Summary Reports are developed from the individual reports.

The following data and information are required for each educational program. The percent of programming time expended on each educational program is reported. Summary reports accumulate this information from all employees who report so that an accurate account of Extension time devoted to educational programs can be documented.

Number of Face-to-Face Contacts - For this purpose "contact" refers to the coming together of two or more individuals face-to-face to participate in an educational experience or conduct Extension-related business. Contacts occur in conferences, consultations, workshops, seminars, meetings, and similar activities in which the mission and business of Virginia Cooperative Extension are carried out. More than one contact with the same individual during a single day can occur and should be reported, if the contacts occur in different educational program.

Number of Contacts by E-mail - The total number of e-mail contacts made in response to requests for information in support of the educational program. E-mail contacts between staff/volunteers and clientele are counted.

Number of Contacts by Telephone -The total number of telephone calls handled in response to requests for information in support of the educational program. Calls from staff/volunteers to clientele are counted.

Number of Contacts by Newsletters - The total number of newsletters distributed to support the educational program. (The number of issues multiplied by the number of people to whom the newsletter is sent.)

Number of Contacts by Non-Electronic Correspondence - The total number of non-electronic correspondences mailed in support of the educational program. Non-electronic correspondence from staff/volunteers to clientele are counted. Examples of non-electronic correspondence are letters, program announcements, and publications requested and mailed to clientele.

Number of Meetings Held - The total number of meetings held in support of the educational program.

Number of Extended Learners - An extended learner is an individual who spends at least four hours (six hours for 4-H membership) per year in a VCE educational program. An extended learner may participate in more than one educational program per year and should be counted in each program. Names and addresses of extended learners need to be maintained for documentation and evaluation.

Number of Volunteers - A VCE volunteer is any person who, of his/her own free will, assists Extension in the accomplishment of its mission. A volunteer can be of any age-- adult, youth or child. Volunteers are not compensated by VCE for their time, but may be reimbursed for travel and maintenance. The total number of volunteers who have worked towards the accomplishment of the educational program during the reporting period are reported.

Number of Hours of Volunteer Time - The total number of hours volunteers have worked towards the accomplishment of the educational objective during the reporting period are reported.

Grants or External Dollars - Any grants or other external funding used to conduct the program. The total amount of funds (dollars) that were secured to plan, implement, or evaluate the program are counted and reported.

Resources Developed - Computer Programs - The total number of computer programs that were developed to support the educational program are reported.

Resources Developed - Publications - The total number of publications that were developed to support the educational program are reported.

Impacts Statements - At least one, but not more than five, impacts must be reported. Impacts reported can be quantitative - for example, the number (and percent) of participants who benefited as a result of participating in an Extension program.

Summaries. The collection of impacts statements are used to generate the narrative reports for each educational program.

Data Summary for 2002-2003 Programs

Based on data from the Planning and Reporting System, there were 4,290,030 contacts in VCE programs during the period July 1, 2002 through June 30, 2003. There were 543,583 extended learners who spent at least four hours (six hours for 4-H membership) per year in a VCE

educational program. There were 33,954 volunteers assisting Extension staff in delivering these programs during the reporting period**.** These volunteers contributed 1,076,711 hours during the reporting period. Tables 1 presents a summary of contact and volunteer data by Extension program area.

Table 1. 2002-2003 Contacts and Volunteer Data by Program Area (July 1, 2002-June 30, 2003)

Program Area	Total Contacts	%	Volunteers	%	Volunteer Time (hrs)	%
4-H	1,352,924	31.5%	19,529	57.5%	691,364	64.2%
Admin.	42,333	1.0%	609	1.8%	1,533	0.1%
ANR	2,149,338	50.1%	9,422	27.7%	336,816	31.3%
FCS	745,435	17.4%	4,394	13.0%	46,998	4.4%
Totals	4,290,030	100%	33,954	100%	1,076,711	100%

This report was written by seven different authors: one for each of the five national goals and one each for stakeholder input and multi and joint activities. The reported was edited for grammatical errors and content. However, writing styles may vary in each of the sections.

B. National Goals

Goal 1: To achieve an agricultural production system that is highly competitive in the global economy

Overview

This highlights Virginia State's and Virginia Tech's 2003 accomplishments in assuring that our state's agriculture is highly competitive in the global economy. Progress in eight theme areas is presented for Goal 1.

- Biotechnology
- New Uses for Agricultural Products
- Agricultural Competitiveness
- Plant Germplasm Development
- Integrated Pest Management
- Aquaculture
- Animal Production Efficiency
- Forest Resource Management

Many issues face Virginia State and Virginia Tech as the institutions work to assure the competitiveness of Virginia's agriculture. Some of these issues are continued pressure on farmlands from urbanization, the rapid pace of new technology (and the challenges and costs of adopting/implementing that technology), low prices for farm commodities, changes in farm support programs, inadequate/changing farm labor pools, addressing new regulations (environmental, pesticides, safety, etc.), the changing structure of agriculture, and the reluctance on the part of some in society to accept the reality and promises of biotechnology.

The research portfolio of the two experiment stations includes 300+ CRIS units of research activity with about 60% of these projects focused partially or wholly on Goal 1 research. Work in the Goal 1 area stretches across many themes from existing and emerging plant, animal, and human food borne diseases to improved technologies and practices for producers, processors, and consumers. These improved technologies are being designed to promote risk-reduction and nutrient-and natural resource-preservation.

Competitive farmers, ranchers and watermen equipped with new knowledge from this research ensure that 1) livestock, dairy, poultry and seafood enterprises will thrive; 2) consumers will eat safe and nutritious food; 3) the health and well being of our animals is enhanced; and 4) wildlife benefit from improved animal health and from our enhanced environmental stewardship. Such is the process of assuring that our state's agriculture is highly competitive in the global economy.

Key Themes

Biotechnology

Viruses of Soybean and Selected Crops and Molecular Basis for Virus Diversity and Pathogenicity. Viruses infecting crop plants reduce yield and quality and, if recognized, can be controlled by resistance or management practices. This project identifies viruses infecting soybean and other crops, host resistance responses, cellular and molecular bases for resistance, and virus epidemiology. Appearance of new, resistance-breaking strains shows the need for new strategies to maintain durability of resistance, and to prevent increased losses from synergy of dual infection with soybean mosaic and bean pod mottle viruses. Analysis of sequence diversity will allow design of rapid methods of follow emergence of these strains in commercial soybeans. The role of viruses in causing losses in quality by discoloring seed coats was demonstrated.

Identification and Mapping of Disease Resistance-related DNA Sequences. Billions of dollars are annually lost due to diseases in major crops including barley, rice and soybean. Development of resistant cultivars is the most practical and environmentally-friendly solution for addressing disease problems in these crops. The premise of this project is to use DNA sequence information from previously cloned resistance genes to facilitate isolation of new disease resistance genes from barley, rice and soybean. Soybean mosaic virus is an important disease of soybean which can cause significant yield losses in susceptible cultivars worldwide. The recent emergence of a new aphid strain, which can serve as a transmission vector for bean pod mottle virus has exacerbated that concern in several soybean producing states, since a combination of the two diseases can have a devastating effect on yield. Researchers have cloned several disease resistance genes, one of which is a strong candidate for Rsv1, the major gene conferring resistance to soybean mosaic virus. On-going characterization and functional analysis of these candidate disease resistance genes should facilitate the development of high yielding and disease resistant soybean cultivars through genetic transformation technologies.

Inositol Phosphate Metabolism in Plants: Altering Plant Development, Stress Response, Signaling, and Phosphate Availability. Inositol and inositol phosphates play many roles in plant growth and development. Inositol phosphates can also be considered environmental pollutants as they accumulate in soils and contribute to phosphorus pollution. This research utilizes a plant model system to develop tools for future manipulation of the inositol phosphates in crop plants. All organisms require the ability to respond to their environment in order to adapt and survive. Second messengers are molecules that allow individual cells within the organism to respond to signals generated outside of the cell. They are produced or degraded within the cell in response to signals and allow for amplification of environmental signals. Inositol phosphatases are enzymes that can break down second messengers. Through our experiments we have defined the molecules required for response to dry or drought conditions. By understanding how these molecules effect physiological changes in plants, we maybe able to engineer transgenic plants with increased tolerance to drought and other adverse conditions.

Metabolic Engineering of Plant Vitamin C Biosynthesis for Improved Nutrition. The project is designed to identify the specific steps in plant vitamin C biosynthesis and use of this knowledge to metabolically engineer crops to increase the production of this important

compound. A new pathway for vitamin C biosynthesis was discovered in plants and this research has shown that at least one of the genes in this pathway can be used to double the amount of vitamin C in plants. It is expected that this gene or other genes in the pathway will be useful in increasing the stress tolerance of fruits and vegetables, prolong their shelf life, and add nutritional value, appeal to the consumer.

Transgenic Animals with Mammary Gland Directed Expression. Pro- and anti-clotting factors (blood proteins) used in medicine are currently obtained from the human blood supply. Unfortunately, this blood supply may contain known and unknown pathogens. A potential new source of needed blood proteins is from the milk of transgenic animals. This project evaluates the gene regulation requirements of the animal mammary gland to produce human blood clotting and anti-clotting proteins in milk of different animal species and assesses the efficiency of producing the structural protein using a mouse mammary gland switch. These studies provide a basis for use of gametes for biotechnology applications in order to improve mammary derived products from transgenic animals. Also, these studies demonstrate that a selective population of gametes can affect fertility in vitro.

New Uses for Agricultural Products

The Science and Engineering for a Biobased Industry and Economy. New applications need to be developed for certain crops, e.g. tobacco, to revitalize the related economy. The purpose of this study is to improve the economics of protein recovery from transgenic plants to compete more effectively with other recombinant protein expression systems in plants. This research expands the scientific knowledge for development of the economical production of biobased specialty chemicals from agricultural feedstocks and residues. Aqueous two-phase extraction shows great potentials as a technique for recovering and purifying recombinant proteins from tobacco hairy root culture. Its capability of dealing with solid materials and versatility will undoubtedly attract more interest from biopharmaceutical and biochemical industries. Results show that a target protein could be purified and concentrated, thus making the recombinant protein production from hairy root system more practical.

Conversion of Corn Fiber to Xylitol. Corn fiber is a byproduct of the corn wet milling industry which is currently used as low-value ($0.05/lb) animal feed. However, corn fiber has a high xylan component which can be hydrolyzed into xylose and subsequently converted into xylitol, a sweetener that has unique pharmacological properties and commands high price ($2-3/lb). This research is developing a method for converting corn fiber to xylitol using anaerobic bacteria. About 4 million tons of corn fiber is produced annually from corn wet milling process. This material is disposed as animal feed at $0.05 per pound. However, by converting corn fiber to xylitol, this product could sell for $3.00 to $5.00 per pound. Thus, the development of this technology is providing new high-value applications for corn fiber instead of the current low value-application as animal feed. This technology would have a considerable impact on US and Virginia agriculture because it would provide new outlets for corn utilization and thus make it more competitive.

Diversified/Alternative Agriculture. Virginia State University Extension faculty conducted applied research and an educational program focused on identifying alternative enterprises that

former tobacco producers in Southside and Southwest Virginia can implement to replace and/or supplement the income lost from tobacco. Conferences, local meetings, field demonstrations, test marketing programs, individual consultations, and other methods were used to reach producers. Profitability of enterprises was determined through financial analysis. Budgets that describe the costs and financial returns were developed and distributed about the most promising enterprises. Specific income opportunities that were presented to former tobacco farmers include certified organic field crops, pastured poultry, pastured pork, organic beef, and certified organic vegetables, early season vegetables grown in high tunnels, certified organic blackberries, fresh cut flowers, seedless watermelons, American ginseng, goldenseal, and agriculture tourism. The shotgun approach of presenting a diverse menu of opportunities helps to avoid over-production and local competition. Over 600 farmers and landowners from Southside and Southwest Virginia who used to depend heavily upon tobacco for income have learned about new income opportunities. Sixty farmers have actually established new enterprises as a result of these educational programs. Most of these have started on a small scale. Fifteen former tobacco farmers are now producing and marketing at least an acre of seedless watermelons as a result of the field demonstrations. Net income from seedless watermelons has been $1000+ per acre, when the melons are sold in local markets. Twenty landowners have established naturalized populations of American ginseng and/or goldenseal in their privately owned woodlands. Ten former tobacco farmers have established cut flowers as a new source of supplemental income. And finally, fifteen farmers have begun raising poultry, beef cattle or swine for selling as "natural meats" in local markets and directly to consumers.

Agricultural Competitiveness

Improving Systems of Management for Soybean and Peanut Arthropod Pests. Currently, producers may over use pesticides in their attempts to manage insect and mite pests of peanut and soybean. Better management programs could result in significant pesticide use reductions, with no loss of crop quality or yield. This project develops techniques for improving management of soybean leaf feeding insects and mite pests of peanut. A large effort was initiated to determine the level of pyrethroid resistance in local corn earworm populations. Corn earworm attacks many crops in Virginia, including sweet corn, soybean, cotton, peanut, tomato and many other vegetables and ornamentals - and most growers apply one or more insecticides in the pyrethroid class to achieve control. Evidence is growing in southern states that corn earworm is developing resistance to pyrethroids. As a result, growers are sustaining crop damage and having to shift to more expensive control alternatives. In 2003, this project determined a resistance level baseline for Virginia. Both adult (3,602 individuals) and larval (579 individuals) corn earworms were collected over the 2003 growing season from throughout eastern Virginia and tested for pyrethroid resistance. Results were encouraging and showed that overall resistance was well below critical levels. A sustained resistance monitoring program will be developed to track development of resistance and to implement management strategies.

Soybean Crop Improvement: A Genetic Engineering Approach to Increasing Phosphorus Utilization. Phytic acid content of plant seeds used as animal feed components results in poor phosphorus availability and the potential for environmental phosphorus pollution of critical watersheds. This project addresses approaches to lowering phytic acid content by introducing genes for degradative enzymes or by blocking the biosynthesis of phytic acid. Modifying

soybean seeds to enhance phosphorus and mineral bioavailability will improve nutrient and waste management in animal diets leading to better agricultural sustainability in intensive livestock production. It will also enhance nutritional availability in human diets with an impact in preventing mineral deficiency.

Biologically-based Sustainable Tomato Production Systems without Use of Methyl Bromide. Agricultural uses of methyl bromide are being phased out due to its negative effects on the stratospheric ozone shield. Biologically-based tomato production systems are being developed for Virginia and Florida, in which cover crops suppress pests, and yields are increased through better irrigation, fertigation and addition of organic matter to soil. The systems developed in this research will allow tomato production to continue after the ban of methyl bromide, and be more profitable in south Florida and Virginia. The appropriate use of cover crops and optimized irrigation schedules and rates will directly benefit the growers by reducing cost of production per unit, substantially increasing yields, and improving fruit quality. After methyl bromide is no longer available, this new set of practices will allow the continuation of profitable tomato production in Virginia and Florida.

Improved Weather-based Advisories and Disease Management Inputs for Peanut Production. Improved weather-based, disease advisories are needed to maximize the efficiency of peanut production in Virginia and reduce the dependency on fungicides. Also, these advisories reduce the need for fungicides and improve the net profits of peanut production in Virginia. Cylindrocladium black rot (CBR) continues to be one of the most devastating diseases of peanut. The primary strategy for CBR control is soil fumigation with Metam. The utility of CBR-resistant cultivars of Virginia-type peanut is limited because of high susceptibility to other diseases and late maturity. Guidelines for soil fumigation that include soil temperature, moisture and the seven-day forecast offer promise for improving the efficiency of CBR control. The Virginia peanut leaf spot R-1 advisory program saves an average of two sprays of fungicide compared to seven sprays on a 14-day schedule. Adoption of the R3-advisory program has resulted in a seasonal total of four sprays of foliar fungicides without increased risk of yield loss to disease. The use of new fungicide chemistry (azoxystrobin, pyraclostrobin, tebuconazole) can allow a further reduction to a season total of only three sprays by delaying the first application to the beginning seed stage (R5). Adoption of this approach improves the efficiency of fungicide applications and reduces the seasonal levels of active ingredient by as much as 25%.

Nutritional Resources for Pollen Bees and Natural Enemies. In recent years, wild honey bee populations have been under stress and have declined to near zero in many locations due mostly to parasite mites. Bee keepers have resorted to continuous use of pesticides for mite control. However, resistance is developing and registration of new pesticides is slowed by concern over residues. The hive beetle, a predator of bee larvae, and the eventual arrival of "killer bees" could add additional costs to bee keepers. Pollination services are likely to become more expensive in coming years. The first year of this Virginia State University (VSU) ARS project aims to address the above mentioned problem. Preliminary results of this project were provided to over 250 farmers at VSU's Annual Agriculture Field Day in FY2002. In research in the second year (FY2003) of this project, pollen was determined for the eastern subspecies of the Blue Orchard Bee in central Virginia. These results will be used to develop the eastern Blue Orchard Bee for commercial use for pollination of spring fruit crops in eastern North America. Blue orchard bees

are an alternative to honey bees as a pollinator for apples, pears, cherries and other tree fruits. These bees are more efficient (40-100 times) pollinators than honey bees, fly in cooler weather, and do not forage far from their nest. These bees are common throughout eastern North America but have not yet been commercially exploited. Basic information on pollen preference will help to establish sustainable management systems for this bee. One research presentation on research results was made at the Annual Meeting of the Entomological Society of America, and preliminary results presented at VSU's Annual Agriculture Field Day with over 300 farmers, producers and others in attendance.

Peanut Production and Marketing. With the implementation of the new Farm Bill in 2002, the peanut growers and peanut quota holders were impacted negatively from an economic viewpoint. During the early fall of 2002, an ANR Agent and Area Farm Management Agent presented financial and management information to persons directly affected by changes to the peanut program. Over 200 persons attended this meeting which helped answer many Farm Bill questions related to the future of peanuts and the financial impact. In a survey of the participants, 90% indicated the meeting was very beneficial to their operation.

Making Sound Production and Business Decisions by Peanut Producers. In 2003 over 400 landowners and producers attended Extension educational peanut production field days and seminars. Due to the challenging changes in the 2003 Farm Bill, many adjustments had to be made in landlord-tenant agreements, and production decisions and approaches. Extension provided this information, which resulted in a more harmonious relationship between tenants and landlords. With the dissemination of production budgets and government programs payment information, many producers were able to adjust and make sound decisions allowing them to remain in business. Land rent adjustments alone have averaged approximately $30 per acre thus reflecting a $1,800,000 upfront reduction in production expense across the City of Suffolk in row crop agriculture. The adoption of new production approaches such as minimum tillage peanuts and applying insecticide and fungicides on threshold demand rather than routine and emotion have kept farmers farming in the City of Suffolk.

Plant Germplasm Development

Production of Vegetable Soybean for Direct Human Consumption. The second year of this VSU/ARS project is a follow-up to two other projects dealing with the development of varieties of vegetable soybeans suitable to Virginia and the mid-Atlantic region to assist farmers in this area to diversify their farm operations and to increase their profit. Vegetable soybean is more nutritious when harvested when the seeds have reached full size and are still green. Consumers are demanding nutritious and quality products. It is imperative to define the proper stage of harvest of vegetable soybean. This project aims to determine the physiological and/or chemical basics of vegetable soybean that could serve as reliable indicators in predicting the proper stage of harvest. The demand for vegetable as fresh or frozen has increased worldwide. Lack of suitable cultivars is one of the factors limiting vegetable soybean production in the U.S. A need exists, therefore to evaluate, identify, and develop soybean cultivars for vegetable purpose. This would offer potential for expanding the domestic and international soybean markets and increased profits to Virginia and mid-Atlantic farmers. Three presentations of project research findings were made at local, state and national meetings. As a result of this breeding research,

three new vegetable soybean cultivars (Omara, Owens and Randolph) were released in FY2003 by VSU in collaboration with ARS/USDA.

Evaluation of Maize Germplasm for Resistance to Cercospora Zeae-Maydis under No-Tillage Production. Cercospora zeae-maydis, a fungal pathogen that survives from season to season on infested corn debris associated with no-tillage practices, threatens grain losses ranging from 15 to 60 percent from gray leaf spot disease on 25 million acres of corn annually in the U.S. This project identifies and characterizes host response and determines genetic inheritance of such resistance in corn germplasm to Cercospora zeae-maydis. Use of resistant germplasm in developing hybrids will prevent significant economic losses from gray leaf spot. Use of gray leaf spot resistant hybrids identified through field tests saves Virginia corn farmers nearly $15 million per year in potential grain losses due to GLS.

Variety and Quality Evaluation of Virginia-Type Peanuts. Data collected from all segments of the industry are needed before decisions on releasing new cultivars are made about advanced peanut breeding lines. Development of new peanut varieties without total industry input can lead to the release of varieties that are acceptable and advantageous only to a particular segment of the industry (growers, shellers, and processors). This project evaluates, provides data, and recommends new peanut varieties for release that are acceptable by the total peanut industry including the grower, sheller, processor, and consumer. The viability of the peanut industry depends upon the development, evaluation, and release of new peanut varieties. Higher yielding, disease resistant varieties with desired milling characteristics and acceptable quality factors must continue to be released for the peanut industry to prosper. VA 98R, Perry, and Wilson are newly released varieties that are beneficial to all segments of the peanut industry. They offer high yields, early maturity (VA 98R and Wilson), bright pod color for the in-shell industry, and other grade and quality characteristics that are acceptable by the total peanut industry.

Development of New Potato Clones for Environmental and Economic Sustainability in Northeastern U.S. To remain competitive, eastern potato growers need new cultivars that are resistant to insect and disease pests, are adapted to a wide range of growing conditions, and address new and existing marketing opportunities. This project examines regional adaptability of germplasm from various breeding programs, including susceptibility to internal heat necrosis. Germplasm evaluations provide information regarding adaptability of new cultivars and advanced selections to the growing conditions in eastern Virginia. Currently, growers rely primarily on one table stock cultivar that is susceptible to early dying, and two chipping cultivars that are both susceptible to the physiological disorder internal heat necrosis (IHN). Identification of new cultivars adapted to this growing area spreads grower risk of economic loss which can be as high as 10-15 percent in years conducive to expression of IHN. Virginia Tech participated with North Carolina, New Jersey, Pennsylvania, Florida, Maine, and New York (Cornell) in releasing ‘Harley Blackwell’ potato in 2003. This new variety is a white-, netted-skinned variety suitable for chipping directly from the field where internal heat necrosis has been a problem for the ‘Atlantic’ variety.

Plant Genetic Resources Conservation and Utilization. Development of new varieties of plants generally requires the utilization of exotic germplasm in order to introduce new and desirable traits into familiar crops. This project examines the utilization of plant germplasm

acquired from the repository in Griffin Georgia into both basic research projects and variety development in Virginia. The major impact of the study of crop germplasm is the release of new cultivars of crop plants. This is a multistage process. The early stages are evaluation of germplasm and identification of genes that affect traits of agronomic interest. This is followed by several years of evaluation of these genes in the background of the crop with the eventual release of a new cultivar. Comparison of newly released varieties with established ones must be done before farmers will be ready to adopt new ones. This project embraces all aspects of the process.

Integrated Pest Management

Enhanced Biocontrol of Insect Pests in Limited Resource Greenhouses. Greenhouse production of vegetables provides an alternative source of income to small and limited resource farmers during the colder months. Insect pest control is a major problem in the greenhouses. Many pest species are common to those found in heavily sprayed ornamental greenhouses and are now resistant to few insecticides labeled for greenhouse vegetable use. Biological control with natural enemies is sometimes the only effective control available. An added benefit of biocontrol is that this form of pest control fits the "organic" label that now has USDA certification standards. This first year VSU/ARS project addresses the greenhouse insect issues using biological controls. Three commercial greenhouse operations in Virginia and North Carolina are participating in this project. A new greenhouse operation successfully completed its first year with assistance given in insect identification and monitoring. Communication between growers was established and Virginia growers were introduced to the North Carolina Greenhouse Vegetable Growers Association. Environmental data loggers were used for the first time in these greenhouses and showed possible savings for heating costs. Pest monitoring reduced the cost of initial use of nematodes and shows promise of thrips control. Major problems encountered in the biological control greenhouse were fungus gnats and thrips. FY2003 experiments of releasing natural enemies (mites in sachet bags) in advance of spring thrips adult's invasion into three commercial greenhouses reduced thrips populations and prevented and/or delayed development of spotted wet virus in tomatoes. Environmental data loggers showed the potential to reduce energy costs for heating during winter months without increasing humidity or pest problems, and the critical times of high humidity imparting disease. Producers are now aware of the best times to ventilate. Results of this research were presented to greenhouse growers at local, state and regional meetings/field days, and at the national Annual Meeting of the Entomological Society of America.

Novel Strategies for Potato Insect Pest Management in Virginia. Insect pests remain important limiting factors to potato production in Virginia. A number of currently-used insecticides may lose registration on potato. This project is examining several new strategies for managing the primary insect pests of potato including Colorado potato beetle, wireworms, European corn borer, and potato leafhopper. Wireworms are a serious pest of potatoes in Virginia typically damaging 10 to 50 percent of tubers if soil insecticides are not applied to fields. Over the past few years, several shipments of potatoes from Virginia have been rejected because of wireworm damage. These losses on 2,500 hectares are estimated at $0.5 million. Chemical control of wireworms has become difficult because of the lack of effective insecticides. Moreover, all of the currently-labeled materials are organophosphates, which are

destined for removal due to FQPA pesticide regulations. Research results show that alternative insecticides such as fipronil, bifenthrin, imidacloprid, and thiamethoxam may be effective products for wireworm control in potatoes. The potential impact of this research is a significant reduction in organophosphate use (estimated at 9 metric tons of active ingredient in Virginia alone), and a marked improvement in the quality of potato tubers produced by Virginia growers.

Improving Systems for Management of Soybean and Peanut Arthropod Pests. Producers sometimes over use pesticides in their attempts to manage insect and mite pests of peanut and soybean. Better management programs could result in significant pesticide use reductions, with no loss of crop quality or yield. This project is developing techniques for improving management of soybean leaf feeding insects and mite pests of peanut. A large effort was initiated to determine the level of pyrethroid resistance in local corn earworm populations. (Pyrethroids are a class of insecticides developed from naturally occurring pyrethrins found in certain chrysanthemum flowers.) Corn earworm attacks many crops in Virginia, including sweet corn, soybean, cotton, peanut, tomato and many other vegetables and ornamentals - and most growers apply one or more insecticides in the pyrethroid class to achieve control. Evidence is growing in southern states that corn earworm is developing resistance to pyrethroids. As a result, growers are sustaining crop damage and having to shift to more expensive control alternatives. In 2003, this project determined a resistance level baseline for Virginia. Both adult (3,602 individuals) and larval (579 individuals) corn earworms were collected over the 2003 growing season from throughout eastern Virginia and tested for pyrethroid resistance. Results were encouraging and showed that overall resistance was well below critical levels. A sustained resistance monitoring program is needed for development of resistance management strategies.

The Virginia Corn Earworm Advisory Program. Each year soybean growers face a destructive insect pest, the corn earworm, which attacks developing pods and reduces yields. This advisory program provides annual predictions of pest abundance and issues weekly advisories to help soybean growers determine which fields need protection and when. In 2002, 7,250 ears or corn were sampled for presence of corn earworm in145 corn fields, in 29 eastern Virginia counties. Very high levels were found and predictions warned growers of the potential for heavy infestations in soybean. Advisories were emailed to growers, crop consultants, dealers and VCE agents. As a result of this educational program, many growers increased field-monitoring efforts to include almost 60 percent of the total soybean acreage, or 251,500 acres. Discovery of abundant corn earworm populations allowed growers to protect almost 85 percent of the state's soybean acreage. This is compared to less than 8 percent having to be protected in 2001 when corn earworm populations were very minimal. This program has paid large dividends over the years both in terms of cost savings to farmers and protection of this valuable commodity from yield-robbing insect pests.

Reducing Pesticide Input around Tomato Fields. In 2002, over 6,000 acres of fresh-market tomatoes were grown in eastern Virginia. Pesticide inputs to commercial tomatoes are probably the highest per acre of any crop grown in the state. For example, growers typically make more than nine applications of insecticides each crop to protect the fruit from a complex of insect pests, most notably thrips, stink bugs, and tomato fruitworms. In addition to the tomatoes, growers early in the season also commonly apply insecticides to the three-foot wide rows of rye windbreaks that occur every seven rows in a field to protect young tomato transplants. Research

in several commercial fields on the Eastern shore in spring 2003 showed that the rows of rye harbor very few if any insects that are potentially damaging to tomatoes. Also, it was shown that spray drift from the insecticide applications to adjacent tomato rows was sufficient to kill most insects occurring in the rye strips. Thus, insecticide sprays directly to the rye windbreaks are not necessary. This information has been passed on to commercial tomato growers via electronic pest updates. Savings to Virginia growers in reduced pesticide costs is estimated at $33,750 (750 acres x $15 x 3 applications).

Aquaculture

Market value of farm-raised hybrid striped bass remains high and hybrid bass aquaculture continues to be profitable for Virginia farmers. Consumer concerns about food safety have increased the demand for locally produced products. Virginia State University Aquaculture Specialists assisted cooperating farmers to obtain permits for growing hybrid striped bass and established demonstration sites in three counties and at the University farm. Demonstrations included both cage and open pond culture in ponds typical for Virginia. Cooperating farmers received cages, feed, and the initial stocking of fish. Extension personnel monitored recommended management practices. Multiple workshops, presentations and fact sheets concerning hybrid striped bass farming were conducted. A web site providing pictures was posted by the Virginia Aquaculture Association. As a result of the educational effort, three new hybrid striped bass operations have been established in addition to the three original cooperators.

Virginia State University established a fish health diagnostic lab in 1993 to aid farmers in identifying fish disease (Health) problems and aid farmers in developing proper management skills. Fish health workshops, using the fish health lab as a teaching tool, have trained and educated fish farmers on the recognition and management of fish diseases that they would encounter on their farm. In addition, numerous fact sheets that are orientated to fish diseases of Virginia have been developed and distributed to fish farmers in the state. The laboratory handles an average of 30 cases annually and provides water quality testing, diagnostic, and suggested treatments for individuals and farms that are experiencing fish health problems. On-site visits are made to conduct diagnostic tests on farmers' properties, and farmers can send morbid specimens to the laboratory for testing. By providing accurate and prompt diagnosis of fish diseases, fish farmers not only reduced fish losses but also increased their fish health management skills by over 50%. These new management skills have reduced fish losses for individual farmers ranging from several thousands of dollars for cage producers to hundreds of thousands of dollars for large open pond and recirculation aquaculture operations.

Animal Production Efficiency

Aspects of Early Embryonic Development and Maintenance of Pregnancy in the Goat. This VSU/ARS project serves to meet the growing global demand for meat, and to assist small and limited resource goat producers to supplement and increase their income. Goats have different forage preferences from cows and sheep. They can be used in production systems to complement other species for pasture and land management schemes. Profitability in low-input production systems as found in the southeast, requires breeds that are reproductively efficient and environmentally adapted. Embryonic mortality reduces potential number of animals born by

20% to 40%, resulting in a reduction of Virginia sheep and goat producer's income by approximately $1.2 million each year. The information generated from this project on the processes involved in embryo development and luteal function is needed to develop methods to reduce embryonic mortality and boost producer income potentials. Preliminary findings from this research were presented to over 300 goat producers, farmers and others at VSU/ARS Annual Crop and Goat/Sheep Field Days in FY2003.

Small Ruminant Meat Production for Virginia: Effects of Species, Breed and Mating System. This VSU/ARS project serves to provide information to farmers on the input requirements for forage-based, sustainable production of meat goats and hair sheep for niche markets and help to establish economical production systems for these two species thus increasing farm profits. The South African Boer and New Zealand Kiko goats have potential to serve as sire breeds for market kid production. A first experiment, in this second year project, evaluated the growth performance of kids sired by either Boer or Kiko bucks mated to Spanish and Myotonic does during a March mating season. Results indicated that high forage diets can be used to produce carcasses suitable for ethnic and niche markets but likely do not achieve the size required for the traditional lamb market. Breed significantly influenced the growth performance and carcass tracts. In FY2003, a foraged-based research experiment indicated that hair sheep lambs grew faster and consumed more forage than meat-type goats under the conditions in this experiment. The increased forage intake in hair sheep may have contributed to faster growth and fat thickness over the loin. Thus, producers should take species difference into consideration when designing small ruminant management systems. Three research abstracts in the Journal of Animal Science were produced from this research, and preliminary results were also presented at VSU's Annual Agriculture Day and Goat/Sheep Expo with over 300 total attendees at these events.

Nitrogen Metabolism and Gastrointestinal Physiology in Ruminants, Swine, and Poultry. It is now understood that absorption of amino acids from the gastrointestinal tract involves the absorption of small peptides (two or three amino acids linked together) in addition to individual amino acids. The purpose of this study is to identify the presence of mechanisms involved in peptide absorption from the gastrointestinal tract and to characterize the functions of these. The overall impact of these results is an improved understanding of peptide and amino acid metabolism. These findings will result in an improved nutritional management of ruminants, poultry and swine such that diets containing less protein will be fed that will result in increased efficiency of production and a decreased excretion of wasted N into the environment.

Comparison of Immunological Effects of Mycoestrogen-Derivative and Estrogen. Persistent low level exposure to environmental estrogens may disrupt reproductive functions and the immune system. The financial loss to producers is poor animal reproductive performance. Additionally, several mycotoxins such as zearalenone are suspected in the increased incidence of human cancer. This hypothesizes that exposure of animals to a-zearalanol, an estrogenic mycotoxin produced by the fungi Fusarium spp., alters the immune system by affecting the functions of T and B lymphocytes. These studies are the first to demonstrate that estrogenic endocrine disrupts, such as alpha-zeralonol, modulate a very important cytokine (protein) (interferon-gamma). Because this cytokine is critical for immunity against intracellular

infections and possibly resistance against cancer, these findings will have an impact by furthering the knowledge in this emerging field.

Morphological Characterization and Dietary Capsaicin Potentiation of Intestinal Immunity in Chickens. Although Salmonella and coccidia present problems to the commercial poultry industry from economic, food-borne illness, or bird productivity standpoints, relatively little is understood concerning the interactions between these pathogens and the host at the level of the intestinal immune response. The purpose of this research is to describe the effector functions of mast cells and eosinophils in innate intestinal immune responses to Salmonella and coccidia in broiler chickens. In the modern commercial poultry industry, increases in disease and infections by enteric pathogens are a persistent concern. In particular, infections caused by coccidial parasites have had a major economic impact on the commercial broiler industry in the past several decades. It has been reported that the US poultry industry suffers in excess of one to two billion dollars in annual losses relating to coccidial treatment, infection, and prevention. Coccidial infection leads to decreased nutrient absorption, decreased weight gains, lethargy, diarrhea, and in severe cases, mortality. Historically, coccidial parasites have been controlled through the use of in-feed coccidiostats. However, through the years, drug-resistant strains of coccidia have emerged, which hinder the efficacy of the presently used coccidiostats. This research indicates that differences exist between isolates of coccidia that result in differential immune cell responses in the intestine and changes in intestinal structure. This could impact nutrient absorption, in commercial broilers. Additionally, the results show that genetic differences in commercial breeds of broilers can impact the susceptibility of broilers to coccidial infection and impact performance. This research contributes to further understanding the cells of the intestinal immune system involved in generation of immunity to coccidia for better evaluation of new vaccines. Also, this research aids in defining the response of current industry breeds to allow the industry to make future genetic selections for commercial stock.

Improving Pasture Nutrition Education in Livestock Producers. Over 100 livestock producers participated in one of four Virginia Grazing schools, and over 150 livestock producers participated in one of three Virginia, Maryland and North Carolina regional nutrition conferences. The two-day grazing schools were designed for more advanced producers; however, each school and conference combined educational programs with practical application and field activates. Post-workshop evaluations indicated that participants rated the programs as excellent, obtained valuable information, and would generally implement practices that would improve pasture management and nutrition.

Improving Pasture Management. Thirty area producers have utilized a sprayer furnished by an extension office to control multiflora rose, autumn olive and other pasture weeds to increase forage production. One hundred fifty producers have attended seminars to learn how to produce and manage their forage resources. Fifteen area producers have reseeded pastures with superior varieties of forage plants as a result of a variety trial conducted locally. Twenty five producers as a result of attending extension programs are now able to graze an additional thirty days by utilizing stockpiled fescue to limit the amount of stored feed needed.

Forest Resource Management

General Equilibrium Analysis of Forest Policies. The economic well-being of rural communities is often closely linked to the management of forest resources in the area. This project is examining the role that forest resources play in rural economies using a general equilibrium approach. The framework and tools developed for analyzing the regional economic impacts of natural resource-based activities could be useful for policymakers who must understand the economy-wide consequences and economic development opportunities provided by these activities. Research results allow a greater understanding of forest landowner decisions that drive regional economic development. The study of reforestation in the Mississippi River Delta was used in policy discussions (by the Governor of Mississippi, Environmental Protection Agency, Corps of Engineers, USDA Forest Service, and others) regarding flood control measures in that area. Further, the study of forest banking arrangements was used by The Nature Conservancy as they formally implemented their Conservation Forestry program that is used to protect threatened and endangered species on private lands. Finally, the mine reclamation work done under this project is being used by the Department of Energy to develop terrestrial carbon sequestration policies in mining regions.

Analysis of a Landowner Decision-Making Framework for Forest Fragment Management Objectives in the Urban Fringe. Nationwide, small parcel forest landowners control 24 percent of the entire nation's private forest land. The majority of these parcels are less than 100 acres in size. This project uncovers why these private landowners in the urban fringe own these lands. In particular, the project is discovering landowner expectations for their forest lands as well as their actual management objectives and regimes. The owners of small forests will have profound impacts on the future of forests and forestry. Private forestry consultants are alarmed by these trends because fees are typically linked to the economic value of wood harvested, and this value tends to be higher on larger, more accessible, and contiguous tracts managed primarily for timber. Public forestry is alarmed because the tax-paying, voting constituency is or may soon be requesting a different set of services--services that many public forest agencies are not equipped to provide. All of forestry is alarmed because fragmentation of ecological systems and timber supply networks may disrupt and change forests and forestry in unknown and undesirable ways.

Quantitative Tools for Spatial and Temporal Forest Management Planning. Forest management requires increasingly complex analyses of spatial data to support resource management decisions. Analyses must incorporate data over large areas and across long time spans. This project will improve the array of quantitative decision support tools available to forest managers. Results from this research will help to expand the use of geospatial technologies such as GIS and GPS by forest managers and planners. Improved awareness of low-cost, easy-to-use GIS packages should enable more smaller-scale operations (forestry consultants, landowners, small companies) to make effective use of these technologies. Better access to these technologies should lead to more informed decision making and more effective resource management. Improved understanding of the magnitude and characteristics of errors in GPS-derived data can help managers and planners assess the utility of results of spatial analyses. Because maps (and estimates derived from them, such as area) are essentially single samples of spatial data, conventional statistical methods for deriving confidence intervals cannot apply. The

results described here are a step toward using other approaches to describe the confidence that users may have in map-derived data.

Enhancing Basic Knowledge of Forest Resources. Seventy-eight percent of the 15.4 million acres of Virginia's forests are private owned, yet most owners do not have basic knowledge of forest resources or know where to go for assistance. As a result of an all day "Woods and Wildlife Conference" for landowners, held in Manassas, 164 participants representing 10,658 acres received increased their understanding of forestry and wildlife concepts. Two-thirds of the participants identified a specific action to undertake within the next 6 months including goal setting and planning (25%) and contacting a natural resource professional (10%).

Urban Forest Workshops. Individual landscape trees and the urban forests of which they are a part of is an often neglected asset by both individual home owners and municipalities in long range planning. Values of single trees can range as high as $100,000 (as a component of landscaping) and that the annual ecological contribution of an average community tree was $270.00 in 1995 for benefits such as storm water abatement. As a result of participation in an Urban Tree Workshop Series for practitioners and manager, eighty six percent (n=53) indicated they significantly increased their knowledge base of urban tree issues and 85% (n=52) indicated a significant increase of their skills to address urban tree problems.

Funding and FTE’s

Extension Funding

Year	Federal	State	Local	Other
2000	3,139,906	8,773,279	1,575,233	1,332,276
2001	3,234,103	9,036,477	1,622,490	1,372,244
2002	3,331,126	9,307,571	1,671,165	1,413,411
2003	3,431,060	9,586,798	1,721,300	1,455,813
2004	3,533,992	9,874,402	1,772,939	1,499,487

Research Funding

Year	Federal	State	Local	Other
2000	11,554,000	18,662,000	0.0	6,784,000
2001	11,856,000	19,214,000	0.0	6,988,000
2002	12,167,000	19,783,000	0.0	7,198,000
2003	12,488,000	20,368,000	0.0	7,413,000
2004	12,819,000	20,970,000	0.0	7,635,000

Extension FTE's

Year	Professional			Paraprofessional		
	1862	1890	Other	1862	1890	Other
2000	125.9	6.8	0.0	0.4	16.0	0.0
2001	114.1	4.7	0.0	0.4	16.0	0.0
2002	88.2	3.0	0.0	0.4	16.0	0.0
2003	90.4	1.8	0.0	0.4	16.0	0.0
2004	125.9	6.8	0.0	0.4	16.0	0.0

Research SY's Only

Year	1862	1890	Other
2000	98.6	7.43	0.0
2001	99.6	7.43	0.0
2002	100.6	7.43	0.0
2003	101.6	7.43	0.0
2004	102.6	7.43	0.0

Goal 2: To provide a safe and secure food and fiber system

Overview

This highlights Virginia State's and Virginia Tech's 2003 accomplishments in assuring that our state has a safe and secure food and fiber system. Progress in eight theme areas is presented for Goal 2.

- Food Accessibility and Affordability
- Food Handling
- Food Quality
- Food Safety
- Food Security
- Foodborne Illness
- Foodborne Pathogen Protection
- HACCP

Food safety is a concern that affects everyone and must address issues from farm to table. The prevention of food borne illness is a major responsibility of food producers, processors, distributors, retailers, and regulatory agencies. To meet the goal of producing safe food products for Virginia, national, and international markets, Virginia Tech and Virginia State University faculty have played a major role in developing internally adopted principles and conducting training programs for producing safe food products. These principles, known as the Hazard Analysis Critical Control Points system (HACCP), Safe Quality Food (SQF), and Good Agricultural Practices (GAPs) serve as a basis for processors and regulatory agencies to identify hazards in producing foods, establishing critical control points in processing for hazard control and monitoring for assuring product safety. Research programs have addressed and will continue to address the sources and incidence of food borne pathogens, environmental effects on virulence and infectivity of food borne pathogens, development of procedures to prevent pathogen contamination, and management practices.

Virginia Cooperative Extension addressed food safety through workshops with agents, farmers, producers, processors, distributors, retailers and consumers. In addition, Extension personnel are working directly with each clientele group on food safety issues. During fiscal year 2003, 27,907 clientele contacts, and 1,774 extended learners, were involved in educational programs on food safety and processing conducted by Extension Agents and Specialists. Our undergraduate and graduate students were taught the principles of food safety in most classes including: food microbiology, food processing, advances in food microbiology, dairy processing, quality assurance, poultry processing, veterinary toxicology, (nearly all food animal veterinary courses have a food safety component), and many others. The Virginia-Maryland College of Veterinary Medicine has research, teaching and Extension programs that ensure that animals entering the food supply are free of disease. The animals may still harbor organisms that are pathogenic to humans including *Salmonellae*, *Cryptosporidium*, E. *coli* O157:H7 and others. Programs are ongoing to develop better detection systems and ways to treat animals harboring pathogens. Food Science and Technology examines food safety issues during processing and develops intervention systems. This department has an active Extension program to train processors,

distributors, federal, state and local government inspectors, and others. Collaborative projects with the departments of Food Science and Technology, Horticulture, Dairy Science, and Veterinary Medicine are training Extension agents to play an important role in farm food safety. These integrated research, Extension, and teaching projects promote HACCP, SQF and GAPs. The Department of Human Nutrition, Foods and Exercise Science works with consumers to promote food safety. The Department of Hospitality and Tourism works with all aspects of the food service industry to enhance food safety.

Key Themes

Food Accessibility and Affordability

Tilapia Production and Marketing. American Tilapia producers continue to have a difficult time selling their fish at profitable prices. Tilapia demand shifted steadily outwards since the fish became widely available in the early 1990's. In 2001, tilapia pushed scallops off the top ten seafood list. But increased demand has not helped American farmers since lower production costs allow foreign producers to grab nearly all fresh and frozen sales. American producers sell their production in the live market. Currently most American production is sold in tanks in American and Canadian ethnic Chinese markets. If American producers are to survive, they must expand that market to other ethnic clientele.

Marketing projects were conducted in the Washington, DC market. Two tanks were built and installed in a Mexican market and Viet Namese market. Virginia Tech students, working under the leadership and guidance of Virginia Cooperative Extension faculty, conducted consumer surveys and wrote a marketing program for the Washington market. They entered this program in a national student contest sponsored by the National Agricultural Marketing Association. There were 35 other programs from mostly land grant colleges in the contest. The students earned third place. The tanks that were built were capable of maintaining better water quality than many tanks currently utilized. The Hispanic format store tank averaged about 400 pounds of fish a week out of the tank at good margins for the first six months. Results of this marketing work along with the survey findings were reported to members of the United States Aquaculture Cooperative. This work is sponsored by the USDA.

Cooperative members like the results of the marketing project that they are now investigating ways they can expand into the Hispanic market. The Hispanic population is growing rapidly in the United States, including Virginia. Virginia Cooperative Extension agents are seeking ways to tap this mostly unexploited market with an expected result of finding a way for them to expand production without causing the price declines past expansions have caused. A grant has been applied for to help them with this work.

Flounder and Finfish Aquaculture. Virginia Cooperative Extension is involved in exploring how better prices can be obtained for flounder caught on the Eastern Shore and how a marine finfish aquaculture industry be established. A building has been built and a twenty foot wooden and fiberglass tank, designed by Virginia Tech, installed in to hold live flounder(fluke) and cobia. The purpose is to see if these fish can be sold into sashimi and live markets. In the late winter trawler caught fluke were put in a live well on deck and were then transferred to the

Eastern Shore Tank. Fish had to be taken then because the fishery was closing but fish caught at that time came from deep water. Coming from deep water stressed the fish and survival was unacceptably low. But the fish that did survive are thriving. Further attempts to keep trawl fish alive will be undertaken this fall when they are in shallower water. However, efforts will now be concentrated on capturing pound net fish out of the Bay. These fish will be low stress. Also, at the beginning of June, 2003, cobia hatched at the Hampton AREC were transferred to the Eastern Shore facility for grow-out. These fish went on feed immediately and are thriving. There have been two recent mortalities. The Cobia and Fluke are cohabiting in the tank well. The fluke stay on the bottom and the cobia are up in the water column. This work is sponsored by the NOAA Sea Grant program.

Washington, DC and Hampton area distributors have expressed interest in these fish for both the live and sashimi markets. They have said they are willing to pay for them at rates that will make the operation profitable while at the same time allowing the flow through facility to pay more money to the fishermen for the trouble of keeping their fish alive. If just a few production problems can be solved this should be a way for several new profitable flow-through operations to be started on the Eastern Shore.

Seafood Packer Profitability. Virginia Cooperative Extension faculty members are working with small seafood packers to determine a measure of profitability on a daily basis. Present measurements, while helpful, usually lack the necessary precision for fine tuning operations on a daily basis. Managers depend on their monthly or quarterly accounting reports to accurately determine whether the company is profitable. However, the information from those reports is too late for the managers to make daily adjustments if they have profitability problems or if they are not being as efficient as possible. To solve this problem, a model of an oyster packer's shucking operation was built describing the physical process of moving oysters from the shell in the bag into the shucked gallon. That physical process was then integrated with appropriate financial information into a spreadsheet model that could be used by both the floor managers and company management for daily decision making. The visible part of the program is easy to use. It was made as “bullet proof” as possible so that non-computer users could utilize it without fear of damaging the program.

During the oyster packing season, floor and upper level managers spent about five minutes everyday recording input information. The resulting information was used to assess results and make operating decisions for the next day. The model did nothing that managers could not have done with a calculator. But producing the same amount of information on a calculator would have required about 50 minutes of work. Because of the time involved, the calculations were not often done and the old “rules of thumb” practices were relied upon. During the off-season this year, the model will be adjusted to account for learning that took place last winter. Other models for other types of seafood processors will be built in the next year.

Food Handling

Horticultural Produce Safety. The spoilage of shelf-stable juices by heat and acid-tolerant bacteria has caused loss of product. Maintaining the microbiological safety of horticultural produce requires vigilance from the farm to the table. Safety of food is a critical issue for

consumers and food crop producers. A related emerging issue is recent requirements by some produce buyers and brokers for third-party inspections of grower's farms. In 2001-2002, a number of growers lost buyer contracts due to a lack of training and certification in Virginia. In response, Virginia Cooperative Extension initiated a new program, Good Agricultural Practices (GAPs), which was introduced to 400+ growers in early 2002, and in winter 2003 an expanded GAPs workshop was offered in five statewide locations, which was attended by approximately 115 commercial shippers. The advanced GAPs workshops were conducted in the Richmond, Northern Neck, Tidewater, Hillsville, and Scott County as collaborative efforts of a Virginia Tech Specialist in Horticulture and Food Science, and VDACS. The programs primary focus was on understanding microbiology aspects of food safety, detailed pre- and post-harvest GAPs procedures, trace-back and record keeping, and introduction and preparation for a new statewide farm certification program offered by VDACS. Measurable impact of this effort has been noted in initial farm numbers (5-10) interested in acquiring certification through 2003-2004, which will continue to grow through 2003-2004. Qualitative and safety improvements of Virginia fresh produce have been better assured as a result of this program.

Food Quality

Insuring High Quality Crab Meat. Imported crabmeat accounts for more than 65% of the product sold in the United States. The economic viability of the Virginia crab-processing industry is under constant pressure from high quality imported crabmeat. In order to enhance profitability, and to promote high food quality, the domestic crab processing industry in Virginia is working collaboratively with alliances and repacking foreign crabmeat during the off-season. A crab processing company requested assistance from Virginia Cooperative Extension in thermal processing and value added development of a crabcake to enter into the fast food market. During the last three years, Virginia Tech scientists from the Virginia Seafood Agricultural Research Experiment Center and Extension agents have cooperated with faculty of the University of Maryland—Eastern Shore, the crab company, and a secondary food manufacturer to provide support to the crab company. The support helped to assure the food safety, quantity and quality of the product for the crab company as it endured the tests and evaluation of the fast food market. Through this cooperative assistance, the crab company is selling crabcakes in 37 fast food stores from Virginia through New Jersey during the 2003 summer season of Memorial day to Labor day. As of this report, over 100,000 crabcakes have been sold, thus adding to the profitability of the Virginia crab producers.

Extending Shelf Life of Fresh Produce. Maintaining saleable quality in fresh fruit and vegetables has been a challenge for Virginia producers. Single base coatings have been used to improve appearance, but are not effective in maintaining quality features in fresh produce. Through Virginia Tech's scientists working at Agricultural Experiment Stations, research was conducted to develop a bilayer coating to maintain and extend quality characteristics in fresh fruit and vegetables, and to monitor quality changes in fresh produce with the aid of a bilayer coating. The collaboration of hydrocolloids and lipids appears to be successful in extending the shelf life of fresh produce, as appearance is important to the consumer when selecting fresh produce.

Flavor Quality of Milk. Light causes nutrient deterioration in food systems, resulting in reduced nutritional value and off-odors and flavors. Thus, the quality of food is greatly diminished. Virginia Tech scientists are involved in research that examines the light conditions which are most detrimental to oxidized aroma development in food systems and possible preventive solutions. Sensory and chemical analysis indicated that the combination of 0.025T tocopherol and 0.025% ascorbic acid was the only treatment that showed no perceivable difference in fresh milk flavor versus that of freshly pasteurized lowfat milk. The combination of tocopherol and ascorbic acid showed a significant reduction in oxidation off-flavor in light exposed milk. This treatment has great possibilities for use in the dairy industry to inhibit oxidation off-flavor development. The synergistic effect of tocopherol and ascorbic acid is proven to be more effective against oxidfation than that of tocopheroal or ascorbic acid alone.

Organic Vegetable Production. Many small farmers in Virginia attempt to earn income through production andmarketing of vegetables. Many small-scale farmers, especially in rural areas, lose money in conventional vegetable production due to low prices. It is very difficult for a small grower with five acres of crops to compete in the same markets with growers who raise vegetables on 300 acres of land. Economies of scale favor the large-scale growers. Organic certification is an excellent way for small farmers to separate their vegetable crops from the crops grown by large-scale, conventional growers. Premium prices are often paid for certified organic produce.

Virginia Cooperative Extension research is focused on 1) investigating the economic costs and returns of organic vegetable production in Virginia and 2) investigating the effectiveness of non-chemical controls of insects and diseases in vegetable crop production and 3) investigating the effectiveness of using cover crops, compost and other organic fertilizers to maintain soil fertility. Organic research and demonstration plots have been established at Virginia State University's Randolph Farm. Over 190 landowners attended the Virginia Biological Farming Conference in 2003 to learn about production and marketing of organic crops. Fact sheets on organic production of specific crops such as blackberries and watermelons have been distributed through Extension Offices across Virginia. About 120 Virginia farms were certified for organic production in 2003. Most of these farmers who were certified by the Virginia Department of Agriculture and Consumer Services are now switching to a private certification agency called Quality Certification Services (QCS). Currently over 4000 acres in organic production exists in Virginia.

Food Safety

International Food Safety Icons. Continued efforts are needed to provide food safety education to the retail food and foodservice industries. High employee turnover and increasing numbers of workers who do not read English can hinder effective training. Through the Virginia Food Safety Task Force, a collaboration of Extension and regulatory and foodservice industry representatives, a series of International Food Safety Icons consisting of directions, warnings, and reminders were developed and published. These icons are pictorial representations of important retail food safety tasks that can be recognized regardless of a person's native language. Retail food workers, who may or may not read English, will be able to understand and comply with these messages to ensure safe food handling and preparation. Use of the icons by food

retailer and foodservice industries will enhance food safety practices and reduce the incidence of foodborne illness.

Food Safety Training and Certification Programs. Heightened awareness, public access to restaurant inspection reports on the Virginia Department of Health web site, and changes in restaurant regulations have made food safety a major concern among food service employees and the general public. This creates an opportunity for education and positive changes for safe food handling. Certification is one way for the food service industry to illustrate knowledge to inspectors. The pass rate for the 97 people enrolled in the ServSafe Foodservice Sanitation class was 88%. All commercial food permit holders in Planning District 9 receive a regular newsletter with educational information, an explanation of any changes in food regulations, and notices of upcoming classes. A different class is offered for nonprofit and church groups entitled Feeding A Crowd. The 90 participants in this class and their respective organizations received a local health department certificate to use at temporary events, prior to inspection. Youth and adults alike also have learned about the proper way to wash hands. Virginia is part of a newly formed Clean Hands Coalition, a national coalition facilitated by the Centers for Disease Control to promote proper hand hygiene for the public with emphasis on three high risk groups.

In FY 2003, 93 professional food service managers from the Roanoke Valley completed the ServSafe Applied Food Service Sanitation course with an average of 80% passing the national certification examination on the first try. Based on pre- and post-tests, 100% of participants showed a significant increase in food safety knowledge.

In Spotsylvania County, 92% (145 of 157) of those enrolled in the ServSafe Foodservice Sanitation Course passed the National Certification Examination with a grade of 75% or above. Of the 19 of 36 school cafeteria food service workers who returned follow-up surveys, 100% stated that they planned to make changes in the way they handle food for cooling and storage to protect students from foodborne illness.

Several types of food safety training for food handlers were held in Planning District 4. This included two,16-hour ServSafe Foodservice Certification courses in which 43 food service workers and managers participated; 42 successfully completed the national certification examination. Seven Occasional Quantity Cooks workshops (a six-hour training) were held in this Planning District with 199 participants. Of this group, 189 received certification from VCE and the New River Valley Health District for successful course completion. This certificate allows temporary vendors to set up their foodservice operation without being inspected by the local Health Department. Certificates are valid for three years. Serving Safe Food (a six-hour training) was provided at the request of ten different organizations and facilities and 339 food service workers attended; 324 of these participants received certification for successful completion. A list of course competencies was distributed with the certificates to assist students in obtaining employment in the foodservice industry.

In the area of Food Safety Education, almost 200 foodservice managers from across Planning District 6 participated in the ServSafe Applied Foodservice Sanitation course in the past year. Over 90% passed the course with an average score of 85 to 90%.

Twenty-three participants (including restaurant, prison, and nursing home food managers) completed the Lancaster 16-hour Serv Safe class with 87 % (20 of the 23) participants receiving a passing grade of 75% or better and becoming certified. It is becoming mandatory in many localities in Virginia that a certified manager be on the premises at all times when the food service facility is in operation.

As a result of participating in the Occasional Quantity Cooks class in Planning District 14, 19 individuals improved their knowledge about food safety as shown on a pre- and post-test. Twenty master volunteers representing 11 church and civic organizations increased their knowledge of food safety during the four-hour Safe Food Handling for Occasional Quantity Cooks course in Planning District 11. This class was co-taught by VCE agents and an Environmental Specialist from the Virginia Department of Health. As a result of participation, these master volunteers plan to continue to share what they learned with 162 other volunteers in their organizations. The following practices are essential food-safety changes that they will implement: monitor strict personal hygiene, monitor time and temperature of foods before/during preparation; take steps to prevent cross-contamination of foods; change the way foods are cooled and reheated during and after events; and calibrate and sanitize food thermometers. Six ServSafe Applied Foodservice Sanitation courses (16 hour trainings) also were conducted in this area reaching 82 foodservice professionals. Eighty-four percent obtained national certification by achieving a passing score on the National Restaurant Association examination.

Various food safety education programs were implemented in Mecklenburg County. Safe food handling and preparation was demonstrated to 32 consumers. When participants completed a post-class survey about their food handling knowledge and behavior, 22 (69%) now understood that bacteria is the main cause of foodborne illness. A follow-up survey indicated that all participants were now thawing food correctly and using separate cutting boards to prepare raw and fresh foods. Sixty-five consumers requested food preservation information and all questions were satisfactorily answered. A newsletter containing updates on food safety issues, helpful to family living, was mailed to 1703 families.

In Southwest Virginia food safety as related to home processing is of major interest. Eleven entrepreneurs attended a workshop on Starting a Food Processing Business and all increased their knowledge of standardizing and manufacturing food products. Nine youth safely and successfully prepared and processed grape jelly and learned about food safety, fruits, and vitamins.

In partnership with the Lord Fairfax Health District, four levels of educational opportunities in food safety were made available: 1) ServSafe Food Sanitation Course for the food service managers, 2) Employee Food Safety Course for food service employees, 3) Occasional Quantity Cooks class for organizations holding food-related events, and 4) general consumer food safety and food preservation. Nine different sections of the ServSafe Foodservice Sanitation Course (16-hour training) reached 164 food service mangers and /or workers, and 113 foodservice professionals (90%) obtained national certification by passing a National Restaurant Association Examination. The Employee course was offered to 229 professionals enrolled in 13 workshops held in Planning District 7. Evaluations revealed that 98% (155 out 158 completing the evaluation) increased their food handling knowledge. One hundred nineteen volunteer food

handlers completed the Occasional Quantity Cooks course. Fifty percent of the course participants who completed a pre- and post-test exhibited a 25% gain in food safety knowledge. Food preservation information was distributed to 41 consumers during pressure canner testing carried out by one trained volunteer.

Scombrotoxin in Finfish. Scombrotoxin is a common source of illness in the United States associated with the consumption of certain finfish species. Biogenic amines are natural anti-nutrition factors that have been implicated in food poisoning episodes. Thus, they have been used as a standard of quality and safety in finfish species, a very important economic factor in Virginia. Normal concentrations of the compounds in major finfish species must be determined as well as the effects of storage conditions and processing variables on their production. The mandatory FDA HACCP regulations require seafood dealers to ensure that products are safe from chemical, biological, and physical hazards. Histamine poisoning, however, continues as a seafood hazard. Through research at Virginia Tech, reduced histamine poisoning caused through fish consumption and increase profitability by minimizing unnecessary product loss is being addressed. The ability to include both commercial fish processors and charter boats in the study provides a comprehensive approach to identifying the scombrotoxin problem. Once the impact of each fishery is identified, specific activities will be developed to address the problem, resulting in the marketing of high quality, safe fish.

Internalization of E. coli in Apples. Certain agricultural practices contribute to how bacteria get into fruit such as apples that might be used for the production of apple cider. The apple industry is a very important economic product for many Virginians. Virginia Tech scientists have determined that internalization of Escherichia coli in whole apples on the tree is not likely, and leads to the conclusion that internalization is a post-harvest problem. Internalization may occur before pressing or processing of apples, leading to an increased risk of infection with E. coli for consumers of apple products that are not properly treated to destroy pathogens. Internalization does occur when apples are immersed in solutions containing the pathogen Escherichia coli 0157:H7, and better post harvest controls must be implemented in order to prevent this in whole apples that are used for cider and juice production.

Remediating Salmonella and Campylobacter on Processed Turkey Carcasses. A two-phase, multi-state survey was conducted in commercial turkey processing plants to assess the contribution of immersion chilling systems management in remediation of Salmonella and Campylobacter on processed carcasses. Phase 1 consisted of a preliminary survey of five turkey plants and included rinsing 100 pre-chill and 100 post-chill carcasses in each plant. Results revealed post-chill Salmonella incidence was significantly increased ($P<.05$) in three of five plants and significantly decreased ($P<.001$) in two plants. Data and observations during Phase 1 suggested chiller management in both plants with significant reductions in Salmonella incidence contributed to improved microbiological quality of post-chill carcasses. Four of the six plants sampled in Phase 2 also participated in Phase 1 and, based upon our initial observations, each implemented changes in chiller management prior to the start of the second survey. For Phase 2, on two consecutive days of processing, direct chiller measurements were obtained to assess management practices, and extensive microbiological sampling of processed carcasses was performed. Significant reductions ($P<.001$) in post-chill Salmonella incidence were achieved in four of six plants, with a significant increase ($P<.05$) observed in only one plant. One plant was

associated with low overall incidence levels that were not statistically different (P>.05). Results were compiled as recommendations for commercial turkey processing facilities describing the contribution of management of immersion chilling systems in reducing levels of Salmonella and Campylobacter on processed, post-chill carcasses in a document entitled, "Immersion Chiller Best Management Practices: Optimization of Microbial Intervention Strategies." This document was distributed to all members of the National Turkey Federation for use by commercial broiler or turkey processors.

Microbial Food Safety Risk Assessment and Intervention for Hydroponically Grown Sprouts. Sprouts are highly value-added agricultural products that can be hydroponically grown the year round. They are in high demand by consumers for their fresh taste, nutritional value, and potential health benefits. In recent years, however, contaminated sprouts have occurred in the United States and around the world. Since 1995, at least seven outbreaks of Salmonella infection and two outbreaks of Escherichia coli 0517 have occurred in the U.S. due to the consumption of contaminated sprouts. One multistate outbreak of E. Coli 0157:H7 infection, which occurred in Michigan and Virginia in June and July 1997, respectively was linked to alfalfa sprouts locally grown from the same seed lot harvested in Idaho. By late July, at least 84 people became ill due to the infection, 36 persons were hospitalized and there were four cases of hemolytic uremic syndrome (HUS), a life-threatening condition that can lead to kidney failure. Enhancing sprout safety is important to Virginia's welfare. In addition to reducing health related costs and issues, the successful development of a locally based sprout industry will continually benefit the growth of the regional economy. Currently, Virginia had a number of local sprout and sprout seed producers. The unfortunate reappearance of sprout-linked disease outbreaks since the year 2000 emphasizes the need for additional food safety research on sprouts. One particular area that has not been thoroughly evaluated is the safety of small-scale sprout production at home or in retail stores, the focus of the Virginia State University (VSU) ARS research. Many small or mini-scale sprouting systems have been developed in recent years and promoted via the Internet. User instructions with these advertisements seldom fully address these associated food safety risk. Furthermore, microbial sampling and testing procedures that are being recommended for whole-sale scale production are impractical for most home or retail-scale growers. These circumstances further intensify current needs for additional sprout safety research. This new VSU/ARS research project is to enhance the safety of hydroponically grown sprouts. The objectives of this research include: 1) gaining an understanding of the safety of locally available sprouts and the risks involved in using small-scale hydroponic sprouting systems at home or in retail settings; 2) improving and developing decontamination techniques for sprout seed and production; 3) utilizing and developing molecular techniques for pathogen detection and identification, and 4) presenting and publishing research results to reach technical and non-technical audiences. Seeds commonly used for sprouting, such alfalfa, mung bean, soybean, and broccoli seeds, will be selected for use in this research. This research is well underway and meaningfully finding should be able for reporting in FY2004.

Food Security

Diseases and toxic conditions may quickly become epidemics which inflict severe financial and emotional losses on food animal producers and companion animal owners. Virginia Tech faculty are involved in studying early detection, rapid investigation, and thorough response to epidemics,

reducing losses and the spread of disease. Bio-terrorism is the intentional use of microorganisms or toxins derived from living organisms to cause death or disease in humans and animals. The threat to the United States of bio-terrorism and agro-terrorism is very real. The results of these initiatives should provide better preparedness and understanding to meet the national agenda in preventing and controlling new, emerging, and re-emerging diseases and bio-terrorism.

In order to ensure public safety for all Virginians, as well as those traveling in our state from other places, continued efforts are needed to provide food safety education to the retail food and foodservice industries. High employee turnover and increasing numbers of workers who do not read English can hinder effective training. Through the Virginia Food Safety Task Force, developed and organized by Virginia Cooperative Extension, simplified food safety messages (directions, warnings and reminders) have been developed for posting on kitchen equipment surfaces. These signs are primarily graphic with minimal wording in English and Spanish. Retail food workers, who may or may not read English, are able to understand and comply with these messages to ensure safe food handling and preparation.

Foodborne Illness

Thermal Processing for Fresh Seafood. Outbreaks of foodborne illness have been linked to the consumption of contaminated or unpasteurized fruit juices, as well as ready-to-eat meats and other foods. Safety of food is a critical issue for consumers and food crop producers. A Virginia seafood processing company requested assistance in thermal processing of a new value-added fresh-not frozen seafood product. Extension agents established a temperature pasteurization profile process for the new product. Due to materials other than seafood in the new product, Virginia Tech scientists recommended that the thermal process be based on the HACCP guidelines using 6-D process for non-proteolytic Clostridium botulinum type B. They determined the 6-D process based on the temperature and pasteurization profile and provided a validation letter to the company. As a result, the seafood processing company has entered a new value-added fresh not frozen seafood product line into a regional grocery store's seafood section. This product is selling in Virginia local and regional markets and should increase the processor's cash flow and profit margin. The product has a long desirable shelf-life and meets definitions as safe and wholesome as required in FDA's HACCP hazard guidelines for consumers.

Canned Food Testing. Canned foods that have been improperly formulated and/or processed present an important foodborne illness risk. Thus, stringent regulations are required for canned food producers. Through the Acidified Foods Testing Program conducted by Virginia Cooperative Extension, over 109 products produced by acidified foods manufacturers in the Commonwealth were evaluated. Thirty-two individual food processors were assisted with product formulation and regulatory compliance toward the goal of reducing the rates of foodborne illnesses.

Foodborne Pathogen Protection

Preventing Pathogenic Bacteria from Contaminating Poultry Products. Production of edible poultry products during the continuum of farm rearing of birds through processing and preparation presents many opportunities for microorganisms to proliferate or contaminate raw

products. Virginia Tech scientists are seeking ways to prevent pathogenic bacteria from contaminating poultry products, to reduce the populations of microorganisms during processing, and examining sampling procedures to characterize a microbial population from live poultry. This project demonstrated the relative effectiveness of microbiological sampling methods that may be used to detect A. butzleri from chickens or their environment. Poultry growers and researchers can now optimize their sampling methods and sampling plans to aid their ability to detect and control this pathogen.

Reducing Incidence of Listeria Monocytogenes in Cooked Ready-to-eat Fish. Virginia Tech Cooperative Extension faculty developed a multi-year program designed to reduce the incidence of the microbial pathogen, listeria monocytogenes, in cooked ready-to-eat fish and fishery products. The program includes continuing education activities and in-plant visits with accompanying product sampling. Product analyses performed during the 2002 - 2003 seafood season indicated no product contained the microorganism during the surveys performed by either Virginia Tech Cooperative Extension or state and federal food regulatory agencies. Prior to initiating this educational activity, several Virginia processors were identified as having volatile products and four firms entered into Consent Decrees with the U. S. Department of Justice. Once the project was initiated, three of the four firms were able to have their Consent Decrees rescinded. Also, no legal action has been taken against any Virginia firm producing fishery products. The estimated annual savings from legal expenses and firm closures due to litigation in either the federal or state court system is estimated to exceed $500,000.

Mosquito Transposable Elements. Virginia Tech scientists and Extension agents are focusing on the analysis of mobile genetic elements known as “jumping genes” in mosquitoes, using modern molecular and genetic techniques. These elements may be used to introduce genes in mosquito populations to control mosquito-transmitted human and animal diseases. Genetic tools developed in this study may also be used to control agricultural pests and plant diseases transmitted by insects. This research on mosquito transposable elements is critically important for improving human health worldwide. Mosquitoes are major vectors for many human diseases such as malaria, yellow fever, and encephalitis, which are among the deadliest in human history. Malaria is currently responsible for more that a million deaths every year in tropical and subtropical countries. The impact of these diseases is on the rise because of increasing insecticide resistance by mosquitoes and drug resistance by the pathogens. Novel strategies to control the transmission of these diseases are urgently needed. This research may also have significant impact on human and animal health, as well as the economy in Virginia. The outbreak of West Nile encephalitis in New York City in 1999, and the rapid spread of the virus in the United States, including Virginia, suggests that mosquito-borne diseases are not just a health problem in developing countries. The genetic tools and approached developed in these studies will be widely useful to control many animal and human diseases transmitted by diverse mosquitoes, including the West Nile encephalitis.

HACCP

Application of Preservatives and Alternative Technologies to Improve Fruit Juice Safety. Virginia Tech scientists and Extension faculty are studying the application of preservatives and alternative technologies to improve fruit juice safety, and to improve the use of preservatives to

prevent juice spoilage. Identification of appropriate antimicrobial levels in combination with alternative processing technologies for the treatment of fruit juices may provide juice processors with an economical means of complying with federal juice HACCP requirements. Determination of pathogen survival in osmotically dehydrated fruit and factors that influence survival in such projects, encourage processing changes and prevent foodborne illness associated with the consumption of related products. Identification of appropriate antimicrobial agents for prevention of juice spoilage may allow fruit juice processors to reduce the incidence of product loss due to spoilage caused by Alicyclobacillus acidoterrestris.

Safety and Quality of Poultry Products. Within Virginia, poultry are the leading agricultural commodity with a value of approximately 800 million dollars per year. Because poultry processing and production is a significant portion of the Virginia economy, it is imperative that efforts are made to maintain or improve the safety and quality of poultry products, and enhance compliance with many recently enacted federal regulations. Virginia Cooperative Extension developed an educational program with the Virginia Poultry Federation to include bi-monthly seminars or workshops on technical and regulatory issues, including HACCP program training. During the past year, more than 250 personnel from processing companies in western Virginia and nearby states have attended these meetings along with regulatory and trade association representatives. These efforts have enhanced the understanding and implementation of practices to improve the microbiological safety and quality of chicken and turkey products from Virginia's processors, and enabled processors to readily comply with federal and state regulations.

Funding and FTE’s

Extension Funding

Year	Federal	State	Local	Other
2000	236,863	661,824	118,830	100,502
2001	243,969	681,679	122,395	103,517
2002	251,288	702,129	126,067	106,623
2003	258,827	723,193	129,849	109,822
2004	266,592	744,889	133,744	113,117

Research Funding

Year	Federal	State	Local	Other
2000	513,000	937,000	0.0	346,000
2001	529,000	965,000	0.0	356,000
2002	545,000	994,000	0.0	367,000
2003	561,000	1,024,000	0.0	378,000
2004	578,000	1,055,000	0.0	389,000

Extension FTE's

Year	Professional			Paraprofessional		
	1862	1890	Other	1862	1890	Other
2000	11.4	0.0	0.0	0.0	0.0	0.0
2001	10.4	0.0	0.0	0.0	0.0	0.0
2002	8.31	0.0	0.0	0.0	0.0	0.0
2003	6.52	0.0	0.0	0.0	0.0	0.0
2004	11.4	0.0	0.0	0.0	0.0	0.0

Research SY's Only

Year	1862	1890	Other
2000	4.9	0.0	0.0
2001	4.9	0.0	0.0
2002	4.9	0.0	0.0
2003	4.9	0.0	0.0
2004	4.9	0.0	0.0

GOAL 3: To achieve a healthier, more well-nourished population

Overview

This highlights Virginia State's and Virginia Tech's 2003 accomplishments in achieving a healthier, more well-nourished population. Progress in 12 theme areas is presented for Goal 3.

- Indoor Air Quality and Environmental Health
- Pest Control and Communicative Diseases
- Health Education for Youth
- Ensuring a Safe and Nutritious Food Supply
- Nutrient Absorption and Metabolism
- Nutrition Education for Adults
- Physical Activity and Fitness Programs for Adults
- Nutrition Education for Youth
- Healthy Weights and Fitness in Youth
- Intergenerational Nutrition Activities
- Expanded Food and Nutrition Education Program (EFNEP)
- Smart Choices Food and Nutrition Education Program (SCNEP)

The risk of cancer, cardiovascular disease, diabetes mellitus, elevated blood pressure, and obesity, major contributors to the growing health care expenditures in the United States, can be lowered significantly by a well chosen and appropriate diet and active lifestyle. Continuing goals for both education and research in the past fiscal year include 1) to ensure a safe and nutritious food supply and healthful environment; 2) to determine the biological role of food components that exert a positive impact on health and should receive attention in a prudent diet, and 3) to provide diet and health information that motivates individuals of all ages to select and implement an appropriate diet and level of physical activity.

Ensure a safe and nutritious food supply and healthful environment. In recent years major nutrition discoveries have centered on plant foods and the chemicals present in plants (phytochemicals) that have health-related properties. Foods researchers are partnering with horticultural specialists to develop edible protein coatings that will extend the shelf life of fruits and vegetables, thus saving money for the consumer and increasing profits for the farmer. Basic research addressing regulation of the fat content in milk, and applied work ensuring the safety of certain fish, both foods of nutritional importance, have the potential to expand our food supply. Work continues on control of disease-bearing pests and efforts to educate consumers on the dangers of excessive pesticide use in the commercial environment and the presence of smoke, mold, and mildew in the home environment.

Determine the biological role of food components that exert a positive impact on health. Naturally occurring antioxidants in the food supply appear to support immune function and may help protect against the deleterious effect of environmental toxins. An understanding of these relationships will contribute to the development of intervention strategies to increase intake of naturally-occurring antioxidants in the food supply. Limited food intake as occurs among young

women who are chronic dieters may exert a toll on bone health, and increase the risk of bone fractures in later life.

Provide diet and health information that motivates individuals of all ages to select and implement an appropriate diet and level of physical activity. Nutrition and health education programs have been directed to all age and income levels with significant resources assisting limited-resource families as part of the Expanded Food and Nutrition Education Program (EFNEP) or the Smart Choices Nutrition Education Program (SCNEP). Opportunities are provided for participation in group settings and study at home with newsletters, videos, or other materials. Two new efforts implemented this year included an educational program for adults that emphasized physical activity in the form of walking, and a curriculum designed to address the growing problem of child obesity. The Healthy Weights for Healthy Kids (HWHK) curriculum was developed for use in school, after school, or recreational settings, and represented a joint programming effort of Nutrition and Wellness agents and 4-H agents as part of the SCNEP program. Components of the HWHK curriculum are applicable to day care providers and training for day care providers was implemented state-wide. Loss of the gerontology specialist as a result of state budget reductions served to reduce programming with the older population. Nutrition and health lessons meeting the Virginia Standards of Learning (SOLs) enabled Virginia Cooperative Extension (VCE) agents to reach several thousand children on school time including those from limited resource families participating in the HWHK/SCNEP programs.

Partnerships with the Virginia Department of Social Services led to cooperative efforts to strengthen community systems serving limited-resource families and provided funding for the implementation of nutrition education training (HWHK) with child care providers statewide. The Virginia Department of Health supported the development and pilot testing of nutrition education kits with activities planned to increase fruit and vegetable use by day care providers and the children in their charge. Collaborative efforts with both public and private schools, as well as home-school groups, has expanded VCE youth audiences for health and nutrition education. A local municipal government strongly urged their employees to participate in the VCE physical activity-walking program, and efforts to involve other employers in such programs are a goal for the coming year. Research collaborations among various departments including Horticulture, Human Nutrition, Foods and Exercise, and Crop, Soil, and Environmental Sciences have been effective in addressing issues that cut across the scope of agriculture, nutrition, and consumer behavior (e.g., bilayer coatings for fresh produce).

Key Themes

Indoor Air Quality and Environmental Health

Reduce Mold and Mildew in Your Home. According to the Environmental Protection Agency, asthma is the most common long-term childhood disease. Nearly one in 13 or 6.4% of school age children in Virginia have asthma, and this number is growing. The leading cause of asthma related symptoms is poor indoor air quality related to allergens such as mold and mildew. Normal daily activities like bathing, laundry, and cooking can release over one gallon of water into a home each day and perpetuate increased moisture levels that support the growth of mold

and mildew. A program entitled Reduce Mold and Mildew in Your Home which explored no-cost and low cost measures to decrease excess moisture in a home reached 86 adults seeking more information on this problem. Based on post-program evaluations, participants with mold and mildew (moisture-related problems) were able to increase the amount of ventilation in their home when performing daily activities involving water, such as bathing, cooking, and laundry. As a result 67 % reported a noticeable decrease in mold and mildew growth and improved air quality. One hundred eighty school age children participated in a six-hour Healthy Homes program. They learned how to prevent unhealthy indoor air quality, reduce pollution, recognize and safely handle home and farm chemicals, identify harmful insects, recognize smoke dangers and fire safety, and safely reduce and remove mold. Twenty-eight volunteers provided 122 hours of volunteer time to make this program possible.

Indoor Air Quality. Three comprehensive Indoor Air Quality workshops were offered for 1) Day care providers, 2) Head Start workers and parents, and 3) Even Start program participants in Franklin County. The Even Start program is directed toward young parents who are concurrently studying for their GED diploma. Collectively, there were 35 completed evaluations. The evaluations revealed the following intended behavior changes: 28 (80%) planned to discontinue using products that contain volatile organic compounds (VOCs); 23 (66%) plan to have their furnace and/or combustion appliances checked annually to ensure that they are functioning properly; 17 (48%) plan to install a carbon monoxide alarm near sleeping areas in their homes; 14 (40%) plan to have their child's blood lead level tested; and 11 (31%) plan to stop smoking around their children. To get a better understanding of what the impact of this type of educational program would be on at-risk families, the data from the Even Start program was evaluated separately. The results are as follows: five (100%) planned to have their child's blood lead level tested; five (100%) planned to have their furnace and/or combustion appliances checked annually to ensure that they are functioning properly; four (80%)plan to stop smoking around their children; four (80%) plan to avoid using products that contain volatile organic compounds (VOCs); four (80%) plan to discontinue the use of unvented combustion appliances such as kerosene heaters in their homes; and three (60%) plan to install a carbon monoxide alarm near the sleeping areas of their homes.

Pesticide Disposal. Outdated, unlabeled, and unwanted pesticides and other chemicals are a danger to both the community and land and water resources, if poorly stored in an unsupervised environment. Virginia Cooperative Extension (VCE) agents gave leadership to pesticide removal programs in several locations. In Carroll County 1,815 pounds of toxic chemicals were safely removed from the community, and a cooperative program with the Virginia Department of Agriculture and Consumer Services (VDACS) in the Danville area resulted in removal of 1,000 pounds of excess, out-of-date, unlabeled, and illegal pesticides. This includes approximately 40 gallons of agricultural pesticides being held by the Danville Adult Detention Facility since they ceased their farming operations 30 years ago. This material was not in a secure location and did present a health and safety hazard to staff and residents. In Orange County the agricultural agent and local farmer's cooperative, along with county government and VDACS, initiated a program to recycle empty and properly rinse pesticide containers. As a result local agriculture producers recycled 1,620 pesticide containers that were properly disposed of. Among 24 pesticide applicators and 13 vegetable producers attending an update conducted in the Henry County/Martinsville area, 14 of the pesticide applicators indicated they would pay more attention

to the storage and disposal of their unused pesticides; the remaining 10 stated they already had such tactics in place, but that the presentation was a good refresher. All 13 of the vegetable producers had not considered secure handling of toxic chemicals a real issue, but seven stated they would pay more attention to the storage and disposal of unused pesticides in the future; six already had such procedures in place.

Endocrine Disruption. Many reproductive and developmental problems being observed in humans and in wildlife are being attributed to endocrine disruption, a process in which chemicals in the environment mimic or antagonize the effects of normal hormones. Synthetic chemical contaminants in the environment such as dioxins, PCBs, and some pesticides have been strongly associated with such adverse effects in a variety of wildlife species and possibly in humans. The purpose of an on-going Virginia Agricultural Experiment Station (VAES) study is to develop a better understanding of the interactions between hormones and the protein receptors through which they act, and the detrimental effect of environmental toxicants that disturb these relationships.

Photolyase Treatment for Humans. As the ozone is being depleted, living organisms are being exposed to increasing levels of ultraviolet light, which generate harmful chemical changes in the genetic code, leading to errors in DNA replication and cell death. Many living organisms protect their DNA against solar light with an enzyme called photolyase; unfortunately, this enzyme is not found in humans. DNA photolyase can reverse the DNA damage caused by ultraviolet light that leads to skin cancer. The goals of this VAES project are to gain further understanding of the reactions of photolyase and development of a photolyase treatment for humans. Potential applications of this research include the development of commercial reagents for skin cancer prevention. Topical skin creams as a drug for skin cancer prevention could positively impact the health of agricultural workers exposed to large amounts of ultraviolet light during field work. In Virginia alone, where high altitudes results in greater ultraviolet light exposure, there were over 30,000 new cases of skin cancer reported in 2001; well over one million new cases were expected for the nation as a whole with resulting medical bills, lost productivity, and premature morbidity. More than 90% of skin cancer cases are attributed to ultraviolet exposure. In 2000 the overall cost of all cancers was estimated to top $180 billion.

Pest Control and Communicative Diseases

Mosquito Control. Health concerns relating to the spread of West Nile Virus and other diseases that are carried to humans by insects and other pests have led to increased efforts to control mosquito and insect infestation. Master Gardeners in Mathews County presented educational information to the local Board of Supervisors about the biology and control of mosquitoes. The Board, in turn, formed the Mathews County Mosquito Advisory Council to provide surveillance and identification of the mosquito population in the County. The Council includes three Master Gardeners and representatives from the local Extension Office. The Council has presented several programs to local civic groups and to other Master Gardener groups, and recently presented an informational forum to over 100 Mathews County residents. Topics included biological control, mosquito identification, reports from State Departments of Health, Transportation, and Forestry, and use of adulticides, repellants, and control devices. Sporadic treatments in the County to control the mosquito population could cost taxpayers an estimated

$250,000 per treatment. Preventive education to consumers could possibly save some of that expense. The overall goal of the newly formed Council is to provide citizens with information about mosquito control and the presence of West Nile Virus and help them make their own informed decisions regarding problems and controls.

West Nile Virus. The threat and incidence of new and emerging human-wildlife diseases are increasing, as evidenced by the recent spread of West Nile Virus and concern about the spread of Chronic Wasting Disease (CWD) from animals to humans. In 2002 alone, 29 humans tested positive (with two confirmed deaths), 45 horses tested positive (with 17 confirmed deaths), and over 900 wild birds of various species tested positive for CWD, according to the Virginia Department of Health. All but nine counties in Virginia also confirmed the presence of West Nile Virus in 2002. In response to an immediate need for accurate and up-to-date information by field agents, municipal leaders, and others, an on-line resource site was developed for West Nile Virus on the VCE public and internal web sites and on the Virginia Department of Fisheries and Wildlife Sciences homepage. Additionally, and in cooperation with the Virginia Department of Health and the local public broadcasting TV network, a 1/2-hour informational program was developed on West Nile Virus to help the public prepare for and respond to the emerging threat this disease poses.

Cockroach Management. Cockroaches are pests because they inhabit human dwellings, produce odors, may transmit organisms pathogenic to humans, and can promote serious asthma reactions in humans. Many of the methods traditionally used for their control have become less effective due to the development of resistance on the part of the organism. To deal with this situation, there is a need for further study of cockroach biology to find new pest management methods. The physiology of the developing cockroach embryo is quite complex, especially as related to water balance, and appropriate water balance contributes significantly to the reproductive success of this insect. An understanding of the structural anatomy of the egg case housing the embryo may provide a basis for improved control strategies for this urban pest (VAES project).

Insecticide Exposure and Parkinson's Disease. There is a consistent epidemiological link between insecticide exposure and the incidence of Parkinson's disease. A VAES project will try to identify any Parkinsonian hazards from insecticide exposure, especially in individuals having impaired brain respiration. Beginning work suggests that ATP-dependent potassium channels also may contribute to the occurrence of Parkinson's disease in old age.

Health Education for Youth

Virginia Adolescent Resiliency Assessment. The December 1999 Virginia Adolescent Resiliency Assessment (VARA) completed at Central High School in King and Queen County provided statistics to be used as a basis for positive youth development programming. The survey also allowed an opportunity for a variety of local agencies and organizations to collaborate on programs to address the identified issues and needs. Concentrated programming resulting from this collaboration focused one full school year on reduction of alcohol use and abuse and one full school year on reducing use of tobacco. Since available statistics indicated these habits were begun at the elementary and middle school levels, programs and activities were

not only provided at the high school level, but at the lower grades as well. In June 2003, the VARA was re-administered and these statistics when compared with the 1999 survey will allow conclusions to be drawn as to the effectiveness of the focused programming. This research, carried out locally, has given more validity to the connection of VCE and Virginia Tech, provided more networking opportunities among local agencies, and opened possibilities for future research and programming. One community leader who assisted in providing funding for the original survey commented"...one thing I know, if Extension proposes something I don't have to worry that they will do what they say they will do." Another community leader noted "...when I came here I had no idea Extension could address the issues I have seen addressed - your resources and programs are excellent. I've never seen another agency work so well and pull others together to make things work for the better of the larger community."

Given recent occurrences of violence, community members are becoming increasingly concerned about the well-being of their youth. The VARA project of VAES, as described above, examines the prevalence of youth risk and protective factors specific to individual communities. Data from this project have been used at the community level in several locations to change school policies and to increase out-of-school time opportunities for youth. Over $300,000 in grant funds have been secured to implement drug and alcohol intervention programs, purchase fitness equipment, secure school counselors, purchase curriculum, and put in place smoking cessation programs. Partnerships involving VCE, schools, local government, and other private and public agencies established across these communities have remained in place to support future efforts.

Tobacco Use. The Tazewell Extension Office received a grant through the Virginia Tobacco Settlement Foundation to teach Skills for Adolescence and Character Counts! to at-risk middle school students. This program gave each student the opportunity to have one on one, focused time with a trained program assistant to help them make wise decisions about life and the use of tobacco. The students completed a 12 week mini course in school and also visited Virginia Tech's Biotechnology Lab to learn about new productive uses for tobacco. Pre-and post-test evaluations, conducted and analyzed by The University of Richmond, indicated a tremendous improvement in the students' confidence as to their ability to make wise decisions regarding use of tobacco, and their ability to educate their peers as to why they chose not to use tobacco. The 104 students completing the program have pledged to be smoke free.

Ensuring a Safe and Nutritious Food Supply

Milk Fat Composition. It would be beneficial from both nutrition and health standpoints to control the amount and composition of fat in milk. Unfortunately, we do not know exactly how the fat content of milk is regulated. This VAES project is investigating what factors regulate the rate at which milk fat globules are formed within milk-secreting cells and the rate of secretion of these globules into milk. Understanding the process of milk fat secretion will be required in order to develop a process aimed at regulating milk fat secretion and affect the amount and type of milk fat content. Discovery of the specific proteins that are associated with the membrane of the milk droplet surface will provide markers and targets that may be manipulated in order to assess their roles in the secretion of milk fat globules. A more appropriate fat pattern in milk

could increase consumption of this important food by individuals who must limit their intakes of specific fats.

Biogenic Amines. Biogenic amines are natural anti-nutrition factors that have been implicated in food poisoning episodes. Thus, they have been suggested as a standard of quality and safety in finfish species. It will be necessary to know the normal concentrations of these compounds in major finfish species, as well as the effects of storage conditions and processing variables on their production. Unless the presence and significance of the concentrations of these compounds are identified, state and federal food regulatory agencies may establish unrealistically low defect action levels which could lead to unnecessary product loss and litigation. Completion of this VAES work will allow the introduction of safe and wholesome fresh scombroid and scombroid-like fish and their products into the market. Also, a rapid method for the quantitative analysis of specific biogenic amines (histamine, cadaverine, and putrescine) would be useful to both industry and government, allowing decisions on product safety to be determined in less than three hours.

Nutrient Absorption and Metabolism

Food Antioxidants. Harmful oxidants present in our food, air, and water contribute to the development of many conditions such as heart disease, cancer, arthritis, diabetes, cataracts, and Alzheimer's disease, and likely hasten the aging process. This VAES research will examine the potential of food antioxidants in reducing the harmful effects of environmental oxidants on subcellular organelles. Uncoupling proteins burn food energy wastefully in that heat is produced, but the energy release is poorly harnessed by the cell. The proteins that carry out this uncoupled oxidation are known as uncoupling proteins. One specific uncoupling protein appears to impact the ability to exercise and be protected by the immune system. This project will evaluate how antioxidant nutrients interact with the role of this uncoupling protein.

Red Meat Consumption. Many adults are limiting their consumption of red meats in hopes of improving their cholesterol levels, but may be compromising their iron, zinc, and copper status. This VAES project is examining the effect of prudent red meat consumption, within the recommendations of the dietary guidelines and portion levels of the Food Guide Pyramid, to establish whether blood cholesterol levels are increased or decreased, and iron, zinc, and copper status improved or not. It has been shown that a significant amount of beef, providing two-thirds of the fat kcal and most of the protein in the diet, when consumed on a daily basis, can help pre-menopausal women maintain or improve their iron status without adversely affecting blood lipid concentrations. Nutrition professionals can use this information to advise the public about their diets.

Chronic Dieting. Chronic dieting is a common lifestyle pattern among many young-adult women. With chronic dieting, the complement of nutrients required for optimal bone health is compromised, yet the impact of chronic dieting practices on bone health in this age group of women is unclear. This VAES research will help to determine the impact of chronic dieting, while controlling for body mass and physical activity, on bone health in otherwise healthy young-adult women. Bone mineral density at younger ages, along with bone metabolism, play critical roles in bone health at older ages and the avoidance of bone fractures in later life.

Nutrition Education for Adults

Elderly Nutrition. Many members of the elderly adult population are at risk for inadequate nutrition. Twenty-four senior adults participated in eight As You Age nutrition lessons in Northwest District. On a pre- and post-survey, 83% reported a positive dietary change by increasing their intake of fruits, vegetables, or milk products. In another location, 97% of the 42 participants in a Nutrition As We Age lesson series reported adjusting recipes to lower the fat and sugar content.

Heart Disease. Heart disease is the leading cause of death and morbidity in the U.S. Fifty-five percent (17 of 31) of Eastern Shore subscribers to the Change of Heart Newsletter who returned evaluations indicated that as a result of the information they received from the newsletters, they have made at least one change in their choices of food to reduce their risk for heart disease.

Healthy Lifestyles. Approximately 60% of U.S. adults are overweight. Understanding our body's nutrient and activity requirements for optimum health can be confusing. To address this problem three healthy lifestyle groups were formed in Culpeper, Madison, and Orange counties and 20 regular participants attended 48 meetings. Moreover, about 600 people attended community health fairs, which conveyed health and nutrition information to the public through displays developed on current topics. During the past year 472 people received one or more of four different chronic disease prevention newsletters. A pilot group of 50 people was targeted for a newsletter series for older adults. Short specific topics were covered and each person decided on personal lifestyle goals. Those completing post-surveys and post-tests indicated both knowledge gained and behavior change. Eating healthier meals, particularly adding more fruits and vegetables, was the most frequent behavior change. Older adults reported eating three calcium-rich foods and drinking eight glasses of water everyday. Participants of the healthy lifestyle groups were assessed and said they cut out extra fat and sugar, controlled portion sizes, and began moving their bodies more; this included those who already were exercising regularly. One participant said the lifestyle group helped her to learn to "eat better without thinking of it as being on a diet." Another participant said "her diabetes numbers were better." All participants said they used the information a lot and told family, friends and fitness class members; one person used the material to write news articles.

Seven programs on Healthy Living were developed and delivered to 271 predominantly low-income, minority men and women in Planning District 13. The participants learned ways to incorporate healthy habits in their everyday living to improve their health. Knowledge increased an average of 43% measured by pre- and post-testing. Sixty (22%) of the 271 participants adopted at least two of the recommended practices of increasing fruits and vegetables to five per day, decreasing sodium intake, and decreasing fat and calorie intake.

Nutrition and Wellness. Nutrition and Wellness programs empower citizens to improve their health and well being and decrease their risk of chronic health problems. Across Frederick, Shenandoah, Warren, Clarke, and Page Counties, 1,592 adults attended nutrition programs on Fast and Safe Meals, Nutrition and Aging, and Food Safety. The 161 participants surveyed reported they could: identify relationships between diet and health; select, prepare, preserve and store food; understand principles of food safety; and changed their attitudes and behavior that

affect dietary patterns and promote fitness and health. In addition, 98% (155 of 158) had gained knowledge and 83% (134 of 161) had gained skills in food-related decisions.

In Portsmouth, 98 senior citizens increased their knowledge of Type I and Type II diabetes, and learned the importance of eating properly as it relates to controlling their diabetes. Both oral and written evaluations revealed that many seniors were unaware of the health risks they were encountering and better understood how to choose more nutritious foods. It is estimated that these classes saved the Commonwealth of Virginia approximately $1,960 in co-payments and prescription drugs.

Sixty individuals participated in the Dining with Diabetes Program in Petersburg. As a result of the program, 80% of respondents (48) are using polyunsaturated fats in their diets rather than saturated fats, and are controlling the amount of carbohydrates that they eat. The Dining with Diabetes Program received a Svoboda Mini-grant of $1000, as well as in-kind donations equaling $4000.

Twenty-three diabetic families in Planning District 13 enrolled in the Dining with Diabetes six-hour developmental program. In addition to nutritional information, lessons included food demonstrations of cooking techniques using artificial sweeteners, reduced food fat replacers, herbs, and spices. End of class evaluations indicated that 17 (75%) of the participants learned how to identify carbohydrates, read food labels, and identify heart healthy fats and sugar substitutes. Fourteen (60%) of the participants felt more confident in food selection and preparation for diabetics. All participants (100%) reported that they learned more about food serving sizes and portion control.

Physical Activity and Fitness Programs for Adults

The Steps to Better Health, a 10-week walking and health education program, was conducted for each locality in Planning District 11 (Amherst, Bedford, Campbell, Appomattox, and Lynchburg). Goals were to increase levels of physical activity, improve dietary patterns, and increase water consumption. The program consisted of weekly educational newsletters and four workshops on Walking Basics, Modifying Recipes for Better Health, Delightful Desserts, and Stress Management. Participants received walking and water logs to track their progress toward meeting their personal three, six, and 10 week goals. There were 77 participants, 25 of which were employees sponsored by the City of Lynchburg. Participant evaluations indicated that the program was highly successful at increasing both knowledge and incorporating healthy habits. Participants indicated that they increased their knowledge significantly about the benefits of exercise, how to exercise in their target heart rate, how to modify recipes to reduce fat and sugar, how to make healthy food selections, and how stress affects health. Of the participants who returned evaluations (38), 71% stated they had changed their dietary habits, 82% increased their physical activity level, and 92% increased their water consumption. Some examples of behavior changes include: "I was a non-exerciser and didn't drink much water and now I exercise 3-5 times a week and drink at least eight, 8-oz. glasses; we have raw fruit or veggies at each meal and as snacks more than we did before; I became more aware of reading labels and reducing fats and sugar; I've lost about 13 lbs. and do feel better about my health." A total of 75 Central Virginia citizens also participated in the program. Evaluations revealed that 76% increased their

exercise, modified recipes to reduce fat and added sugar, learned how to read food labels more effectively, and learned how to exercise within their target heart range. Eighteen adults in Mecklenburg County enrolled in and completed the Steps to Better Health program. Participants wrote a statement indicating their physical activity goal, and received daily record sheets to track the number of times they walked, and their water intake logs. Weekly motivational and informative newsletters were mailed to each member of the group. All participants reported increasing their walking by 30 minutes on most days of the week. Ten (56%) reported that the walking program helped keep them motivated because of the weekly newsletters that they received and their daily logs showing progress.

Nutrition Education for Youth

In a 21st Century Community Learning Center after school program, 68 primary and middle school students received 12 nutrition lessons and a corresponding cooking experience. A pre-survey indicated that 24% (16 participants) could correctly identify the food groups on a Food Guide Pyramid diagram. The post-survey showed an increase of knowledge with 76% (51 participants) being able to correctly identify the food groups.

A School Nutrition Education Series (four, 45-minute lessons) was taught for 1,677 second and third graders in 15 schools in Planning District 4 from October 2002-May 2003. Two lessons addressed increasing dietary intake of fruits, vegetables, and whole grains. One lesson was on increasing calcium consumption, and another on healthy lifestyles. Teacher program evaluations were excellent with documented improvements in eating behaviors and knowledge of students. Cumulative results show 74% tried at least one new food, 74% now read food labels, 83% consumed more milk, 78% increased daily physical activity, and 82% increased the number of fruits and vegetables eaten.

As a result of the Food Fundamentals Nutrition Program in five Prince Edward kindergarten classes, 71% of parents responding to an evaluation felt their child's eating habits had changed by increasing consumption of fruits and vegetables and/or their willingness to try new foods. On the same evaluation, 57% of the parents felt their child's knowledge about the Food Guide Pyramid had increased.

Thirteen low-income, high-risk participants in Southside Virginia enrolled in The Great Team project. The goal was to introduce a healthy lifestyle through nutrition education, self-esteem building, and physical exercise. All participants (100%) indicated an improved ability to plan menus and choose healthy foods from the Food Guide Pyramid and Dietary Guidelines. Ten (75%) wrote personal action plans to adjust physical activity for health and weight control. Eight (60%) improved their intake of fruits and vegetables. Seven (50%) implemented their plan to increase physical activity, walking at least 3 times per week for 30 minutes.

In Lancaster County, 59% (19 of 32) 12 to 13 year olds, when asked orally, showed improvement in the selection of lunch beverages after receiving four, one hour lessons on the Food Guide Pyramid and nutrition labeling. Available choices included 2% milk versus fruitopia

drinks. Students learned after reading the label, the number of calories sugar adds to the diet and consequent weight gain.

VCE professionals worked with the entire 4th grade at Stuart Elementary School, approximately 90 at-risk students, teaching them about agriculture and the science of gardening. These youth also participated in planting and harvesting a garden on school grounds. All of the students in this 4-H club were from the inner city and many of them had never had the experience of working in a garden before. Approximately 78% of these youth said they learned about new vegetables that they had never heard of before. Five students stated that they have started planting vegetables in their yards at home and plan to one day have a large garden. Vegetable gardening may be an indirect way of increasing consumption of vegetables in limited-resource families and youth.

Healthy Weights and Fitness in Youth

Childhood Obesity. A foods and nutrition specialist from Virginia who serves as the Northeast Representative on the USDA Leadership Team on Childhood Obesity prepared and distributed a bi-monthly USDA e-newsletter entitled Reversing Childhood Obesity Trends: Helping Children Achieve Healthy Weights. The newsletter began in July/August 2002 and is distributed to over 2,000 individuals nationwide referred by Extension Specialists in each state. It provides research-based information and updates on childhood obesity, sources of educational resources, and information on upcoming events, conferences, or meetings focused on achieving healthy weights in children. The newsletter is also posted on the Center for Weight and Health website of the University of California; the VCE Childhood Nutrition and Fitness intranet site; and the Virginia Action for Healthy Kids website. The e-newsletter has placed VCE in the national spotlight as a resource in this programming area.

In October 2002, VCE provided leadership for the formation of Virginia Action for Healthy Kids (VAHK), a coalition of 64 individuals representing a wide variety of health agencies, organizations, and schools, and co-chaired by the First Lady of Virginia, Lisa Collis. VAHK was organized to address childhood obesity on a statewide level. The coalition is committed to two main goals: 1) To ensure that healthy foods and snacks are provided in vending machines, school stores, and other venues under school control; and 2) To provide age-appropriate and culturally sensitive instruction in health and physical education that will help students develop the knowledge, attitudes, skills and behaviors to adopt, maintain, and enjoy healthy eating habits and a physically active lifestyle. In this capacity, we have developed guidelines for healthy vending machine and a la carte items in schools, as well as a Resource Guide and 10th grade curriculum for teachers. This next year will be devoted to implementing these initiatives, with the support and help of the Virginia Department of Education. The Resource Guide and 10th grade curriculum were showcased at the Health Institute at James Madison University in Harrisonburg.

Young children are a target audience for chronic disease prevention because the rate of childhood obesity is increasing in Virginia as it is nationwide. The Virginia Department of Social Services Child Care Licensing division utilized Extension agents to provide training at 10 sites to child care providers across Virginia. Ten Food, Nutrition, and Health Extension Agents

conducted the interactive hands-on sessions. A total of 332 child care providers participated in the workshops and received four different VCE food, nutrition, and health publications. Comments on the training included: "Wonderful handouts." "The packets were full of needed information for children and adults; recipes are wonderful!" "I was also amazed with the visuals about how much sugar our kids get in their fruit drinks." "No more in our house; I'm so pleased to have a nutrition class geared toward children; I'll think of calories, fat and sugar whenever I cook or feed the children; I plan to provide material and conversation with parents about making better choices before and after they leave my facility; I will take a lot of the recipes to the center and home; great snacks and fun exercises; I'm going to cut my portions down - very eye opening; I will use this information to further more nutritional activities in my classroom." Media events occurring as a result of these workshops: seven community presentations on childhood nutrition and fitness; seven press releases; two radio spots; and one TV spot.

Nutrition Education. On a post evaluation conducted with the child care providers attending the nutrition education workshop in Gloucester, 75% indicated they now realized that teaching nutrition to the children in the day care setting is important to their developing good eating habits at home. Responses from a group of 34 child care providers in central Virginia indicated an excellent rating on the curriculum and trainers of 88%. Many providers indicated their desire to use the material immediately including improving snack choices and incorporating games and physical activity ideas.

Two four-hour workshops were presented to 52 Virginia Department of Social Services Licensed Child Day Care Providers in Planning District 13. Caregivers reported improved attitudes about healthy eating, increased knowledge of healthy food choices, and improved skill in selection and preparation of healthy foods, as well as increased awareness of the benefits of physical activity for children. Evaluations indicated the intention to adopt healthier food practices in their centers.

Sixty-seven child care providers in Portsmouth learned how to incorporate music and physical activities into the learning environment when working with children who were at risk of childhood obesity. Eighty-five percent of participants stated the activities boosted their own energy levels and changed their attitude towards caring for children.

Twenty-three child care providers in Planning District 11 participated in one of two, two-hour training sessions offered in the "5 A Day" Nutrition Education pilot program. The pilot program involved the use of two educational kits directed toward the use of fruits and vegetables that included books, educational toys, and visual aids along with an activity and reference guide. Of the 23 providers who were trained to use the kits, 11 used the kits with the children in their care (each kit was used six times, with one provider using both kits during the pilot). Evaluations of the kits and activities indicated that they were effective in helping deliver nutrition education programs, helping children to learn healthy nutrition habits, and encouraging children to try new fruits and vegetables. Childcare providers stated that when the kits were used, children would eat more fruits and vegetables than they usually did and parents commented that their children asked for foods (including broccoli) that they had never eaten before.

A Childhood Healthy Weight Coalition was formed in Prince Edward County and an action plan was developed. As a result of several teachers' workshops being presented

throughout the county, 79 teachers reported their awareness of the health impacts of childhood obesity had increased or greatly increased. Sixty-three teachers reported they plan to make changes in the way they interact with children to facilitate improved nutritional status and increased physical activity.

Youth Fitness. A conference for medical professionals, entitled Too Heavy, Too Young: Assessment, Treatment, and Prevention of Childhood Obesity, was held in September, 2002. Over 70 medical and health professionals including physicians, physicians' assistants, nurse practitioners, nurses, dietitians, and health educators from the Rockbridge and Augusta areas attended the conference. Evaluations were very positive, and all attendees planned to implement the activities and resources received at the conference. The school foodservice director for Rockingham County Schools was motivated by this conference to conduct research in his school system to determine if school lunches are contributing to the increase in childhood obesity.

Various groups within the community are being reached with information relating to child fitness and well-being. Basic food preparation programs for the 9 to 19 age group were conducted for 77 youth. Additionally, middle and high school youth in Orange County were surveyed (1387 useable surveys were returned) about lifestyle choices and thoughts about themselves that contribute to positive health or other behaviors. The community has been made aware of how teens view themselves and committees have formed to work on specific issues of concern.

On the Eastern Shore, 102 youth ages 8 to13 participated in the Healthy Weights for Healthy Kids series at five Parks and Recreation Summer sites. One hundred percent of these youth were able to successfully identify and correctly place food items in the appropriate food group and to recall the number of servings for each.

Intergenerational Nutrition Activities

Healthy You, an intervention program targeting various age groups with nutrition lessons and diet planning concepts, reached 170 participants. This program focuses on increasing fruit and vegetable consumption among at-risk families in whom low use of these foods is prevalent. The Healthy You program was expanded to reach targeted preschoolers participating in the Sure Start Center program (Warren County at-risk 4-year-olds), Be-4 (Clarke County at-risk 4-year-olds), and Head Start (Frederick County at-risk 4-year-olds). Older citizens were recruited to deliver the nutrition education to the preschoolers. The matching targeted audiences of senior citizens came from the Warren, Clarke, and Frederick County Senior Centers. Through this program 83 senior citizens were trained as mentors to teach simple nutrition concepts to 87 preschoolers with a total of 2,368 hours and $5,906 donated to the project. These resources were contributed by Head Start, the Area Administration on Aging, Eagle's Club, Sure Start, and one church. The goal for the preschoolers was to introduce them to fruits and vegetables, help them understand the relationship of food to good health, and provide interaction with a positive older adult role model. The senior citizens had the opportunity to review the importance of good nutrition and become more motivated to make healthy food choices of their own. Parents were involved through newsletters, workshops and in some cases, enrollment in SCNEP. Classroom teachers received kits to use in teaching the nutrition concepts of the month. The current eight-month post-evaluation demonstrated the following results: 100% of the children distinguished fruits and

vegetables from other foods; 92% of the families tried new fruits; 85% of the families tried new vegetables in their diets; and 92% of the families included fruits and vegetables in their diet each day

Expanded Food and Nutrition Education Program (EFNEP)

The Virginia Expanded Food and Nutrition Education Program (EFNEP) reached 3,642 homemakers and 7,748 youth in the 2003 fiscal year. During this period 900 volunteers contributed 11,395 hours to the implementation of this program. Statewide, 85% of EFNEP participants showed improvement in one or more nutrition practices (plans meals, makes healthy food choices, prepares foods without adding salt, reads nutrition labels, or has children eat breakfast). Eighty percent showed improvement in one or more food resource-management practices (plans meals, compares prices, does not run out of food or uses a grocery list), and 70% showed acceptable food safety practices.

Nutrition education was taught to clients throughout Northern District which includes Planning Districts 8, 9, 10, and 16. A compliment to this education was donated food with an estimated value of $120,000 used to supplement food for families that typically run out of food by the end of the month. This donated food also allowed VCE agents and Program Assistants to prepare nutrient dense foods with their clients so that they learned how to cook nutritious meals. Clients also take home the same food supplies so they can prepare the same meal at home for their families, which allows them to stretch their food dollars. During this reporting year a $10,000 grant was given to help feed hungry children. This grant provided nutrition lessons to children and helped them learn how to prepare nutritious snacks and meals. This money has enabled the program to help alleviate hunger while working with the children.

Smart Choices Food and Nutrition Education Program (SCNEP)

The Virginia Smart Choices Nutrition Education Program (SCNEP) serves clients in 100 of the 110 counties in Virginia and in 91% of the independent cities having an Extension office. Approximately 15,256 households were reached with a direct, in-depth nutrition education program consisting of 6 to 12 lessons. Many others were reached with short-term nutrition education designed to build awareness of healthy eating and a positive lifestyle, and serve as a recruitment tool for the program. Adult participants were taught mostly in groups, but individual sessions and self-learning videos were also used with some participants, based on the individual's preference and work schedule. Program Assistants also responded to nutrition questions and requests for materials from participants via e-mail, telephone, or surface mail. A new program Healthy Weights for Healthy Kids was developed this year for delivery in schools having 50% or more students eligible for free or reduced price lunch. In total the program reached 7,113 adults and 8,143 youth with a minimum of six nutrition education lessons. Impact data collected from adults completing six or more lessons indicated that 90% showed a positive change in food group intake based on Food Guide Pyramid recommendations. Also, improvements were seen in intakes of several nutrients including iron, calcium, vitamin A, vitamin C, and fiber.

In Planning District 6 most of the nutrition education delivered through the SCNEP program is conducted via Super Pantries. This represents a cooperative effort among Extension, the food bank, and a community agency. The pantries provide participants with nutrition education, the development of food preparation skills, and food to take home. Participants have the opportunity to try new, healthy recipes at the pantries with an opportunity to taste. They truly learn by doing. Participants report an increase in nutrition knowledge, a gain in food preparation skills, and an increase in self-esteem as a result of the Super Pantry program. One pantry participant learned that she could make cole slaw at home. She stated, "You mean I can make cole slaw! I thought I had to buy it at the store." The most recent SCNEP Super Pantry in Harrisonburg targeted Latino families (an underserved audience). Latinos are the largest minority population in the district. All nutrition lessons were interpreted in Spanish, and all nutrition education materials including handouts, videos, and recipes were in Spanish. The Latino clients who participated in the pantry stated that as a result of this program they now eat less grease, have switched to skim milk, and eat more vegetables.

In Planning District 9, the educational activities of the three Program Assistants were expanded through the use of $19,888 of adult-donated food which went to clients via teaching sessions with the help of 28 volunteers. As a result, 88% of the 218 adult participants showed improvement in one or more food resource-management practices. Additionally, 93% demonstrated acceptable food safety practices upon exit. Within this district some of the adult SCNEP clients take advantage of low income and elderly tax assistance, a jointly sponsored program of VCE, the Internal Revenue Service, and the American Association of Retired Persons. In Orange, Madison and Culpeper Counties, 641 people had federal and state tax returns completed by 18 volunteers.

As a result of a $3,000 grant from the Lenowisco Health District Cardiovascular Health Program, the Lee County Garden Program was able to serve approximately 55 additional EFNEP/SCNEP eligible individuals and also increase the average worth of supply vouchers. This reflects a 17% increase in participants over last year. Program participants received vouchers redeemable for plants, seeds, and fertilizer that enabled them to grow a home vegetable garden. In addition to gaining knowledge and skills about healthier eating through the EFNEP/SCNEP programs, involvement in the garden program afforded opportunities for increased physical activity for all members of the family. Time spent gardening is time spent away from TVs, computers, video games, and other sedentary activities. Some individuals felt this was a good opportunity for them to spend 'family time' together and for children to learn more about how foods are produced. Others were appreciative of the chance to stretch their food dollars further. The Garden Program also received funding support from other agencies including the local United Way office ($2,700), the Dickenson County Food Bank (seed potatoes valued at $2,000), and the Lee County Farm Bureau office ($500).

Funding and FTE's

Extension Funding

Year	Federal	State	Local	Other
2000	1,654,126	4,621,834	829,845	701,854
2001	1,703,750	4,760,489	854,740	722,910
2002	1,754,863	4,903,304	880,382	744,597
2003	1,807,509	5,050,403	906,793	766,935
2004	1,861,734	5,201,915	933,997	789,943

Research Funding

Year	Federal	State	Local	Other
2000	222,000	405,000	0.0	150,000
2001	229,000	418,000	0.0	154,000
2002	236,000	430,000	0.0	159,000
2003	243,000	443,000	0.0	163,000
2004	250,000	456,000	0.0	168,000

Extension FTE's

Year	Professional			Paraprofessional		
	1862	1890	Other	1862	1890	Other
2000	26.3	0.4	0.0	52.1	0.0	0.0
2001	21.0	0.6	0.0	85.0	0.0	0.0
2002	17.5	0.85	0.0	75.0	0.0	0.0
2003	16.2	1.0	0.0	98.2	0.0	0.0
2004	26.3	0.4	0.0	52.1	0.0	0.0

Research SY's Only

Year	1862	1890	Other
2000	2.1	0.0	0.0
2001	2.1	0.0	0.0
2002	2.1	0.0	0.0
2003	2.1	0.0	0.0
2004	2.1	0.0	0.0

Goal 4: To achieve greater harmony between agriculture and the environment

Overview

This highlights Virginia State's and Virginia Tech's 2003 accomplishments in achieving a greater harmony between agriculture and the environment. Progress in six theme areas is presented for Goal 4.

- Integrated Pest Management
- Natural Resources Management
- Nutrient Management
- Soil Quality
- Sustainable Agriculture
- Water Quality

Some of the relevant key themes in Virginia for this goal are agricultural waste management, air quality, integrated pest management, land use, natural resources management, nutrient management, soil erosion, soil quality, sustainable agriculture, and water quality. Virginia Cooperative Extension has educational programs in these key areas conducted by Extension Specialists at Virginia Tech and Virginia State, and by Extension Agents in 107 county and city offices. In addition programs are conducted by research and Extension faculty at 13 Agricultural Research and Extension Centers located around the state.

Agricultural waste management and nutrient management are critical areas of importance in achieving harmony between agriculture and the environment. Best management practices (BMP's) which reduce non-point source pollution are important and are in constant need of refinement. Some examples of selected BMP's are buffer strip cropping, no-till crop production, stream protection, and storm water retention ponds. Because many factors impact the effectiveness of BMP's, it is important to evaluate them over time under many environmental and geographic conditions. Long term field monitoring is important to document effectiveness. Also rainfall simulators and mathematical modeling can also be tools in evaluating results. Dietary changes in animal diets can result in decrease of excreted nutrients such as phosphorus and nitrogen. Research is ongoing to determine optimal nutrient levels in animal diets.

Air and water quality are important components of the environment. Certainly odors from livestock production units can create major problems. Odors usually are most evident when manure is disturbed. This is usually when being removed from the production facility and moved or land applied. Water quality can be adversely impacted when BMP's for management of agricultural wastes are not followed. Water quality can be impacted by sediment, nutrient, pathogen, and chemical pollution of groundwater, streams, and waterways. Since parts of Virginia are in the Chesapeake Bay watershed major emphasis has been given to water quality in the past.

Integrated pest management is a coordinated approach to reducing pesticides by employing non-chemical alternatives. Some of these alternatives are resistant varieties, cultural controls, and

biological controls. When chemical controls are needed they should be used in a manner consistent with providing a safe food supply.

Natural resources management is an important component of harmony between land, water, and a clean environment.

Partner agencies in support of this goal include the USDA's Natural Resources and Conservation Service (NRCS), Virginia Department of Environmental Quality (DEQ), and Virginia Department of Agriculture and Consumer Services (VDACS).

Key Themes

Integrated Pest Management

Corn Earworm. Each year soybean growers face a destructive insect pest, the corn earworm, which attacks developing pods and reduces yields. The Virginia Corn Earworm Advisory provides annual predictions of pest abundance and issues weekly advisories to help soybean growers determine which fields need protection. In 2002, 7,250 ears of corn were sampled for presence of corn earworm in 145 corn fields, in 29 eastern Virginia counties. Very high levels were found and predictions warned growers of the potential for heavy infestations in soybean. Advisories were emailed to growers, crop consultants, dealers and VCE agents. As a result of this educational program, many growers increased field-monitoring efforts to include almost 60 percent of the total soybean acreage, or 251,500 acres. Discovery of abundant corn earworm populations allowed growers to protect almost 85 percent of the states soybean acreage. This is compared to less than eight percent having to be protected in 2001 when corn earworm populations were very minimal.

Fresh Market Tomatoes. In 2002, over 6,000 acres of fresh market tomatoes were grown in eastern Virginia. Pesticide inputs to commercial tomatoes are probably the highest per acre of any crop grown in the state. For example growers typically make more than nine applications of insecticides each crop in order to protect the fruit from a complex of insect pests, most notably thrips, stink bugs, and tomato fruitworms. In addition to the tomatoes, growers early in the season also commonly apply insecticides to the three-foot wide rows of rye windbreaks that occur every seven rows in a field to protect young tomato transplants. Research in several commercial fields on the Eastern shore in spring 2003 showed that the rows of rye harbor very few if any insects that are potentially damaging to tomatoes. Also, it was shown that spray drift from the insecticide applications to adjacent tomato rows was sufficient to kill most insects occurring in the rye strips. Thus, insecticide sprays directly to the rye windbreaks are not necessary. This information has been passed on to commercial tomato growers via electronic pest updates. Potential savings to Virginia growers in reduced pesticide costs is estimated at $33,750 (750 acres x $15 x 3 applications).

Corn Borer. Late-season European corn borer injury in non-Bt cornfields in western Virginia was very low in 2000 and 2001 amounting for less than 8% of the 76 surveyed fields. In 2002, corn borer infestations were higher with 38% (n=50) of the surveyed fields exhibiting economic loss. Factors which played a role in last years infestation were two hard spring frosts and one of

the severest droughts on record. Consequently, many fields had to be replanted which placed them at much higher risk to late-season corn borer infestation. Overall, of the 126 total fields in the 2000-02 survey, 20 (n=25) averaged one or more 1-inch tunnels per stalk. When this relatively low infestation level is combined with the fact that most of the corn grown in western Virginia is chopped for silage, most growers probably will not benefit over the long term from the higher cost of Bt hybrids compared to non-Bt hybrids. The findings are more favorable for the 1997-99 corn borer survey in eastern Virginia. Unlike western Virginia, the majority of corn grown in eastern Virginia is shelled for grain. Of the 172 total non-Bt cornfields surveyed from 1997-99, only 7% (n=12) experienced economic damage. Extrapolating these findings for eastern Virginia strongly suggests that the higher cost of Bt hybrids may not be justified given the low level of corn borer infestations across the region. Adoption of this research by growers in eastern and southeastern Virginia has the potential to save over $1.6 million annually.

Pesticide Education. As a result of the "2002 Extension Pesticide Safety Educators Workshop," conducted by Virginia Tech Pesticide Programs in Blacksburg from November 5-6, 2002, over 80 Extension agents learned new technology and information to better serve the citizens of the Commonwealth. The workshop involved 24 speakers and 12 field and classroom sessions. An on-line portion of the course was developed to support agent's year around. This on-line "course" used the Blackboard Course Management program to manage on-line instruction and build a library of support media for agents, including over 70 PowerPoint presentations to teach clientele aspects of pesticide safety and technology. Sixty-five agents used the on-line course throughout 2002-03 to enhance their training programs in the field.

Hampton Roads horticulture agents collaborated for pesticide re-certification conferences in the VDACS categories of 3a (Ornamentals), 3b (Turfgrass), 5a (Aquatics), 6 (Right of Way), 7a (Structural Pests) and 7b (Stored Food Pests), 10 (Demonstration and Education), and 60 (Registered Technician). Partnerships with the Mid-Atlantic Horticulture Short Course, local governments, the Virginia Turfgrass Council, yielded seven conferences this year. At the five VCE sponsored seminars, attendance was 603 professionals. They reported 316,156 acres in ornamental crop or turf production. One hundred ninety-five evaluations were collected and 185 persons indicated they would improve their pesticide handling or personal safety practices as a result of VCE training. (This data was collected at VCE sponsored events only.)

In December of 2002 and January of 2003, Virginia Cooperative Extension Agents worked together to conduct a series of five classes on pesticide use and safety for farmers in Rockingham, Augusta, and Highland Counties. Surveys showed that attendees managed a total of at least 124 different farming operations and 36,109 acres of agronomic crops and pasture annually. At the end of the meetings, participants were asked the following question: Do you think you will improve the way you use pesticides or protect yourself from them because of something you learned today? Farmers managing 115 different operations and 34,646 acres of agronomic crops and pasture annually answered: Yes.

As a result of the Virginia Pest Management Technology Information Program (part of the Southern Region Pest Management Center) a stakeholder group (growers, specialists, and agents) developed a pest management strategic plan (PMSP) for peanuts in Virginia and North Carolina. This is one of only 24 plans active in the United States. This plan was developed

between Virginia Tech and North Carolina State University Pesticide Programs. The two states conducted a formal PMSP stakeholder committee meeting in April 2002. The plan was published on the USDA Office of Pest Management Policy web site in July 2002. Similar PMSP stakeholder meetings were conducted in June 2003 with apple growers from the Mid-Atlantic (VA, WV, MD, PA, NJ, and DE) region and Christmas tree growers from VA, NC, and TN. These efforts are designed to enhance pest management programs for stakeholders through improved education and research programs and to give growers input into the regulatory process associated with the Food Quality Protection Act and its impact on the agricultural industry.

In addition to developing pest management strategic plans, Virginia Tech Pesticide Programs worked with stakeholders to publish five new crop/pest management profiles (fact sheets) on watermelon, potato, alfalfa, tobacco, and pepper to be used in the development of strategic plans and communicating crop/pest management needs to the EPA and USDA. These were also published on the USDA/OPMP web site.

Natural Resources Management

Forest Landowner Education. The Virginia Forest Landowner Education Program was established in 1997 to educate Virginia's forest owners about sustainable management of their forest resources. To date the program has offered 73 short courses throughout the state, focused on woodland management, wildlife management, land conservation, and profitable timber marketing and harvesting. 1,628 forest owners have participated in these workshops, representing over 327,200 acres of forest land. On average, participating landowners report that the education they receive will enable them to save or earn an additional $61 per acre on their forest land, a potential statewide impact of over $14.2 million. Additionally, participants report that they either have or will engage the services of a professional forester or other natural resources specialist in managing their land in the future. Studies have shown that use of professional land managers
greatly assist forest owners in better achieving both their financial and environmental goals.

Logger Programs. In fiscal year 2003, 1,393 Virginia loggers participated in 6,260 contact hours of professional-level training at locations across the Commonwealth through the SHARP ("Sustainable Harvesting And Resource Professional") Logger Program. The SHARP Logger Training and Education Program is administered by, and uses curriculum and educational materials developed by, Virginia Cooperative Extension. Funding and in-kind support is provided by the Virginia forest industry. Training topics in 2003 included logging safety, harvest planning, water quality protection and best management practices, sustainable forestry, and logging business management. Since the SHARP Logger Program began in 1995, logging injury rates have decreased by 50% and compliance with forestry best management practices has increased 34%.

Turf. A two-day Turf Seminar was held at two different locations in the Northern Virginia Area. Turf management topics were taught for grounds maintenance professionals. Pesticide recertification credits were offered for participants who need recertification credits for the Virginia Department of Agriculture (VDACS) in categories 3a, 2, 6,60 and Core. Eighty-two percent of the participants surveyed stated they have more environmentally sound alternatives as

a result of the class and 96% of the participants surveyed stated that as a result of the topics discussed in the seminar, they are more aware of pesticide security.

Wood Products. Wood products Extension faculty where able to assist the hardwood lumber drying industry in reducing the losses of hard and soft maple lumber due to enzymatic staining. The results of these efforts include an estimated 10-15% reduction in loss for over 6,000,000 board feet/year with a total estimated increase in value of $1,080,000/year.

Forestry. Forty-five new users of Extension forestry educational programming participated in and completed an introductory logger training course. These participants, who have a direct impact on over 18,000 acres yearly, indicated changes they would make to their operations to include the use of logging Best Management Practices to reduce sedimentation and erosion hazards, pre-harvest planning techniques to improve efficiency and increase their safety on the job by more regularly inspecting their equipment.

Participating pallet manufacturers in Extension programs reduced lumber consumption by 1.1%. This is an estimated savings of 72 million board feet of lumber for the manufacture of new pallets. In addition, 299 million wood pallets were received for recycling. This is a savings of 3.876 billion board feet of lumber for pallet manufacture.

Nutrient Management

Agricultural Wastes. As agricultural wastes such as poultry litter and dairy manure become more regulated due to water quality concerns, maintaining and documenting crop yields and crop removal rates will be critically important for farmers to validate their yields and not solely rely on book values developed by Virginia Tech and the Department of Conservation and Recreation. Virginia Cooperative Extension Agents composed and presented a draft of a proposed tax credit for the purchase and installation of on-farm scales (either permanently installed or portable) to the Virginia Best Management Practices (BMPs) Advisory Committee. The Committee approved the tax credit and farmers will be able to apply for the tax credit (up to $17,500).

Dairy Wastes. A three year field study on 20 Shenandoah Valley dairy farms indicated that the Virginia dairy industry could reduce by dietary manipulation the amount of phosphorus and nitrogen annually excreted by cows by 1,844 tons and 905 tons, respectively. Results were reported to the industry in the Virginia Dairyman, as well as at meetings and a Dairy Technology and Conservation Tour. The impact would be reduced environmental nutrient pollution and reduced ration costs on Virginia dairy farms.

Nursery and Landscape BMPs. Virginia nursery growers and landscapers benefit from incorporating tenets of sustainable agriculture through Best Management Practices (BMPs) designed to maximize resource use efficiency while minimizing adverse ecological impacts. Eight collaborative nursery and landscape BMP programs were presented to 264 industry and Extension professionals. Rigorous quantitative evaluations of the impact of these programs document improved practices in water and nutrient use on over 20,000 acres of land in production and maintenance to date.

Wheat. Virginia has approximately 240,000 acres of wheat. Average nitrogen input is 100 lbs./acre/year or 12,000 tons. Research at Virginia Tech indicates it is possible to increase the nitrogen use efficiency by 18% reducing nitrogen loading by nearly 2200 ton/year and save over $1,000,000 in fertilizer costs.

Soil Quality

Application of Biosolids. The application of biosolids to farmlands, a practice promoted by Virginia Cooperative Extension, has increased to over 30,000 acres annually in Virginia, resulting in an improvement in soil quality and a savings of $60 to $120 per acre in fertilizer and lime costs. This amounts to at least a savings of 1,800,000 to 3,600,000 million dollars annually.

Conservation Tillage. Total acres in conservation tillage practices for all crops increased from 49% to 51% of the total crop acres in Virginia according to the National Crop Residue Management Survey. A local program supporting conservation tillage enrolled ten crop producers representing seven operations in a ten- month program that provided education on developing continuous no-till rowcrop systems. The ten producers participated in monthly classroom and field demonstration sessions. Each operation committed one tract under their management to the development of a continuous no-till system. These seven operations represent approximately 4,100 acres under row crop management systems. Upon completion of this program all seven operations will work toward developing cropping systems that will be based on no-till production practices.

Sustainable Agriculture

Environmental Management System for Poultry. Working with Virginia Farm Bureau Federation, Virginia Poultry Federation, Virginia Department of Conservation and Recreation, and Virginia Department of Environmental Quality, a program has been developed to help poultry producers to develop an Environmental Management System (EMS) for their operation. An EMS is a voluntary process that helps producers integrate environmental considerations into their production decisions. An EMS assists producers in assessing and prioritizing the environmental management considerations of their operations and in planning and making changes needed to reach environmental and economic goals. Three workshops have been conducted across the state to assist Virginia Poultry Producers in developing an EMS. A website has been created to provide follow-up information and electronic access to record keeping forms. This project is part of a national effort to develop EMS for agricultural enterprises. Project impacts are being evaluated on a national basis through the Learning through Evaluation, Adaptation, and Dissemination Center at the University of Wisconsin, Madison, Wisconsin. This is a three-year project, ending in 2004.

Dairy. A Dairy Environmental Management Checklist was developed and reproduced for dairy producers. Approximately 50 farms were visited to promote the practice. In addition 12 farms participated in a pilot environmental management system project and an Emergency Action Plan was developed to assist in the case of emergency. Plans are being distributed to all Virginia dairy farms.

Improved Crop Record Keeping. From January through June of 2003, a team of Extension Agents serving the Shenandoah Valley promoted the need for improved crop yield record keeping among forage producers at 13 different educational meetings in Augusta, Rockingham, Rockbridge, and Highland Counties. At these meetings, the Agents argued that improved crop yield records can improve farm risk management (by improving budgeting and financial forecasting, by making crop insurance more attractive,
by reducing the potential for crop and financial losses due to mandatory nutrient management regulations, etc.). Surveys showed that attendees at these 13 meetings included farmers managing a total of at least 143 different farming operations and 52,226 acres of agronomic crops and pasture annually. At the end of each of the 13 meetings, participants were asked the following question: As a result of what you learned today, will you do a better job keeping crop yield records in the future? Farmers managing 55 different operations and 19,606 acres of agronomic crops and pasture annually answered: Probably. Farmers managing 54 different operations and 21,066 acres of agronomic crops and pasture annually answered: Definitely.

Integrated Disease Management Website. Over 28,000 requests for information were made last year (FY 2003) to the Integrated Disease Management web site maintained by faculty in Plant Pathology and Weed Science. This site provides information on the identification of pathogens and diseases that attack wheat and barley, pathogen biology, cultivar resistance, cultural control, and treatment thresholds for chemical control. As a result of these contacts clients are better able to make informed decisions on disease control options for small grains production in Virginia.

Corn. Results from hybrid trials conducted by Extension faculty indicate that 80% (200,000 acres) of corn growers in the western half of the Commonwealth select hybrids that are recommended as moderately to highly resistant to gray leaf spot disease. Selection of these more resistant hybrids increases grower yields by about 20 bushels per acre per year. This saves four million bushels of corn production for Virginia growers. The grain value is about $6,000,000 per year.

Pesticide Container Recycling Program. In cooperation with the Virginia Department of Agriculture Office of Pesticide Services and the Bedford County Department of Solid Waste, Virginia Cooperative Extension initiated a pesticide container recycling program in Bedford County. A total of 367 containers ranging from quart size to 30-gallon drums were recycled in 2002. In addition the Extension agent in Orange County worked with the local farmer's co-op, county government, and VDACS to offer an empty properly rinsed pesticide container recycling program for local agriculture producers. As a result of this program 1,620 pesticide containers were recycled and properly disposed.

A Section 18 request for the use of Axiom (flufenacet) herbicide for control of diclofop-resistant annual ryegrass in wheat was written, submitted to VDACS, and approved by the EPA. This allowed ryegrass control on a maximum of 50,000 acres on which production would not otherwise have been possible. Alternatives for control of this species were discussed and demonstrated in 20 meetings and field days.

Water Quality

Non-point Source Pollution. A research project at Virginia Tech seeks to develop possible alternative approaches to the analysis and extrapolation of hydrological and water quality data related to non-point source pollution in agricultural watersheds. In Virginia data collection and analyses needed to complete approximately 650 TMDLs by 2010 are currently estimated to cost $60,000,000. Significant savings can be achieved if alternative approaches can be validated.

Fecal Pollution. One of the most serious issues that has emerged when using new tracking technology for sources of fecal pollution in water is how often water samples need to be taken. To address this issue, stream samples from Mill Creek, Montgomery County, VA, were collected monthly for one year, plus weekly for four consecutive weeks during seasonal high flows (March), and seasonal low flows (September-October), plus daily for even consecutive days within each of the weekly schedules (30 stream samples per site for each of two sites, 60 total). Forty-eight isolates of E. coli per sample (total of 1,440 stream isolates) were fingerprinted by source and the resulting fingerprints were compared against a known-source E. coli library (1,158 isolates). The 12-month averages for bacterial source tracking (BST) were not different from the daily and weekly averages for high flow and low flow, both sites, and indicated that monthly sampling was adequate. There was a seasonality effect in that the human signature trended higher during high flow (if it was present at all) while the livestock signature dominated all samplings and the wildlife signature was slightly higher during low flow. Results indicate that sampling should be done over a time period that includes both seasonal wettest and driest periods (at least eight months for the mid-Atlantic region). Quarterly and every-other-month sampling was not adequate, and weekly sampling may be preferable in periods of high flow. These results have been adopted by state regulatory agencies as a guide in deciding what level of sampling is needed to perform total maximum daily loads (TMDLs) on watersheds in Virginia.

Water Quality Education. Most people do not understand what basic water quality indicators mean, how they are measured or the implications of poor water quality. To address this issue, a Virginia Cooperative Extension specialist at Virginia State University created an interactive PowerPoint game entitled *What Do You Know About Water Quality?* The game contains six quiz boards – two introductory levels, three contest levels and one wild card level. The introductory levels deal with basic water quality terms and concepts. The three contest levels deal with six primary water quality parameters: pH, alkalinity, dissolved oxygen, hardness, nitrate and phosphate. The contest games become progressively more difficult. Finally the wild card game deals with a variety of water quality issues such as toxics and invasive species. A leader-guide entitled Water Quality Indicators was created as a reference for the program. A youth project guide is also planned. Pilot testing of the program has produced the following results. A presentation to 15 Extension 4-H Agents was well received. Evaluations rated the program 4.6/5. Comments included: “Looks like a very useful program.” “Can’t wait to use it.” “Look forward to seeing the youth project.” A pilot audience test was conducted with 18 high school students studying for the state Envirothon contest. A pre/post test survey of program indicated an 83% increase in knowledge and understanding of water quality indicators.

Pond Management. In cooperation with county Extension agents, Virginia State University Extension faculty planned and conducted two workshops for more than 100 farm pond owners in

Southside Virginia. The workshops focused on pond management for recreation, fun and profit. Water from the farmers' ponds were tested as part of the workshops. Additionally, follow-up on-farm visits were conducted to determine water quality of farm ponds. Test results were given immediately to clients with recommendations on how to improve water quality. Written reports were sent later to farmers and Extension agents with the results of the test and recommendations for farm pond improvement. The workshops resulted in about 50% of the attendees taking some action to improve the water quality of their ponds. The main action taken for improvement was to increase the alkalinity and hardness of the pond allowing it to be more productive for growing fish. Eight site visits were conducted to analyze farm ponds for recreational and aquaculture uses. More significantly, the workshops created opportunities for pond owners to start cage culture of fish. Several of the attendees indicated that they would try cage culture in their ponds. The workshops increased participants' farm pond management skills by at least 30 to 40 percent.

Chesapeake Bay Academy. To help public school teachers understand and meet the definition of a meaningful watershed education experience for their students, a Virginia State University Extension Specialist participated on the Virginia Resource Use Education Council to conduct the Chesapeake Bay Academy, June 16 - 20 at St. Margaret's Academy in Tappahannock. The Council is a collaboration of representatives from Cooperative Extension, Virginia Natural Resource Agencies, the Chesapeake Bay Foundation, the Department of Education and others. The Academy included sessions on Chesapeake Bay processes and issues, a summary of the Chesapeake Bay Program and introductions to numerous NREE curricula. Teachers also participated in ecology field trips to several coastal sites, a historical tour of Tangier Island and open water sampling trips. Teachers were assisted in planning "meaningful experiences" for their students as well as integrating watershed education throughout their curriculum. Thirty-six teachers participated in extensive classroom and field study programs that provided the background and hands-on training in water resource education. Teachers rated the program 5.4/6 overall and 100% indicated that they understood the definition of "meaningful watershed education." All were prepared to incorporate it into the classroom and felt comfortable in using many of the instructional methods they learned. Nearly 75% of the participants rated the field experiences as the most valuable component of the training and 66% were able to directly address the new watershed standards of learning. This program will translate into "meaningful watershed experiences" for nearly 3500 middle and high school students. The program was funded through a grant from the NOAA Watershed Education Program.

Watershed Experience. Virginia Cooperative Extension faculty from Virginia State University collaborated with Chesterfield County and Friends of the Chesterfield Riverfront (a non-profit citizens group) to receive NOAA funding for conducting an extensive 12-hour teacher-training program concerning the "meaningful watershed experience" requirement. The Friends personnel provided instruction and planning for school *Bay Scapes* development (rain gardens, non-point pollution control, etc.). The Extension Specialist conducted a four-hour field study training involving, physical, chemical and biological observations that teachers can replicate on their school grounds. In addition, six hours of curriculum training was conducted involving use of the Enviroscape (land use model), groundwater model, aquatic insects, water quality and curriculum such as *Project WET* and *Nature Scope*. Teachers received resource and curriculum packets and thorough hands-on instruction. Thirty-two teachers participated in the training. Pre-course questionnaires indicated that teachers were keenly interested in getting information and training

to meet the "meaningful watershed experience" requirement and lacked the necessary background and skills. Post-program evaluations rated the program 4.7/5. Comments included: "Lots of great activities." "There was a wealth of knowledge." "Couldn't be better." "Could have used more time." "The training was fun, with interesting ideas and entertaining." "The hands-on training was very practical." "This will be used in my classes." "Especially liked working with the experiments at the stations." "It introduced me to material I didn't know and will help me better explain it to my students." "It gave us lots of ideas that we can use for a couple of years." Twenty-nine of the participants stated that they were capable of meeting the "meaningful" definition with their classes.

Poultry. Subject to change, currently, Virginia ranks fourth in turkey production and eighth in broiler production. Annual estimated revenue to the state from poultry alone is near $600 million. Along with this agricultural bounty comes the environmental and aesthetic impact of poultry manure on surface water, ground water agricultural land human health, and aquatic animals. These problems result from runoff and leaching of nutrient components in manure and fertilizers have been identified as major anthropogenic causes of eutrophication of fresh water and estuaries in the United States. Moreover, phosphorus (P) in the single most important nutrient that must be managed if control of eutrophication of fresh waters is to be made. Although nitrogen (N) may limit plant and algae growth during certain periods of the year, P is most often the nutrient of concern, since most algae are able to obtain N from the atmosphere. Consequently, controlling algae blooms and eutrophication mainly requires reducing P inputs to surface water. In estuaries, both P and N must be controlled because P is the limiting nutrient in the upper, fresh water portions and N in the saline regions. Controlling P inputs to surface water can be difficult, but is usually easier from preventing N inputs. In general as N concentrations have increased (by atmosphere and rainfall input plus greater N losses from leaching), P has become the limiting nutrient for the growth of aquatic organisms be contracted to prevent eutrophications. The PI has completed a project which assessed the effects of 1) soil particle size distribution on P sorption, and 2) chemical addition on P mobility in soils. A new Virginia State University (VSU) ARS project, entitled "Nutrient Composition Assessment and Management of Poultry Litter," is now underway to identify the forms of nutrients (primarily organic and inorganic forms of (N and P) that originate from poultry manure, which are suspected pollutants of surface and groundwater. By doing so, it will build a database which will serve as a source of information for proper management of poultry manure and its land application. It will generate useful information that can be used by poultry farmers, state regulators and Extension personnel. A second objective of this project is to examine the potential use of selected native grass species to retain nutrient runoff from poultry amended field plots. It is anticipated that the massive root system of these grasses would make them ideal for utilization in the nutrient interception and runoff retention.

Plasticulture Runoff. The VSU ARS project "Removal of Pesticides From Plasticulture Runoff Using Vegetative Filter Strips" serves to determine the effectiveness of switchgrass and fall fescue filter strips in removing dissolved endosulfan and a cooper-based fungicide from plasticulture runoff. Vegetables grown using plasticulture is a large industry in the mid-Atlantic and other regions of the U.S. It is estimated that about one to five percent of field applied pesticides are removed by surface runoff and enter surface runoff and enter surface water bodies. This research provides quantitative data that will aid in the design of vegetative filter strips that

can reduce insecticide and copper-based fungicide loads in plasticulture runoff. Producers will have a choice to use either grass or in combination based on their effectiveness thus protecting water quality. In FY2003, experiments were conducted to determine the quantities of alpha endosulfan , beta endosulfan, atrazine, and metolachlor removed from runoff by natural thatch or fresh switchgrass residue. Results show that thatch left in a field can interrupt and retain endosulfan, atrazine, and metolachlor from runoff, thus protecting surface water from agricultural chemicals. This project terminated in September 30, 2003. Over the three year life of the project, two referred journal articles were published, five non-technical articles were developed and disseminated, and six presentations were made to farmers, colleagues and others at local, state, regional, national meetings and agriculture field days.

Funding and FTE’s

Extension Funding

Year	Federal	State	Local	Other
2000	1,194,104	3,336,471	599,060	506,663
2001	1,229,927	3,436,565	617,032	521,863
2002	1,266,825	3,539,662	635,543	537,519
2003	1,304,830	3,645,852	654,609	553,645
2004	1,343,975	3,755,228	674,247	570,254

Research Funding

Year	Federal	State	Local	Other
2000	2,585,000	4,072,000	0.0	1,458,000
2001	2,650,000	4,191,000	0.0	1,502,000
2002	2,716,000	4,313,000	0.0	1,547,000
2003	2,785,000	4,439,000	0.0	1,593,000
2004	2,856,000	4,568,000	0.0	1,641,000

Extension FTE's

Year	Professional			Paraprofessional		
	1862	1890	Other	1862	1890	Other
2000	54.8	0.6	0.0	1.6	0.1	0.0
2001	58.7	0.6	0.0	1.0	0.4	0.0
2002	50.4	0.2	0.0	1.0	0.1	0.0
2003	45.1	0.2	0.0	1.0	0.1	0.0
2004	54.8	0.6	0.0	1.6	0.1	0.0

Research SY's Only

Year	1862	1890	Other
2000	21.1	2.11	0.0
2001	21.3	2.11	0.0
2002	21.5	2.11	0.0
2003	21.7	2.11	0.0
2004	21.9	2.11	0.0

Goal 5: To enhance economic opportunities and the quality of life among families and communities

Overview

This highlights Virginia State's and Virginia Tech's 2003 accomplishments in enhancing economic opportunities and the quality of life among families and communities. Progress in 13 theme areas is presented for Goal 5.

- Aging
- Character/Ethics Education
- Child Care/Dependent Care
- Children, Youth and Families at Risk
- Communication Skills
- Family Resource Management
- Agricultural Financial Management
- Home Safety
- Jobs/Employment
- Parenting
- Promoting Business Programs
- Supplemental Income Strategies
- Youth Development/4-H

Virginia Cooperative Extension is committed to enhancing economic opportunities and the quality of life for citizens of the Commonwealth of Virginia. During the reporting year, farm families, rural and suburban families, and families of urban populations benefited from Virginia Cooperative Extension's (VCE) educational programming. Reported impacts of VCE programming validate that quality of life for families, as well as the capacity of communities and local government to improve the quality of life for both children and adults in their respective jurisdiction.

Virginia Cooperative Extension's Agriculture and Natural Resources Agents (ANR) and Specialists conducted educational programs that helped sustain the profitability of agricultural and forestry production, while protecting and enhancing land and water resources. Programming efforts addressed a broad range of issues from traditional agricultural management and production in livestock and crops, to farm business management, soil and water conservation, land and water quality, the safe use of pesticides, forestry and wildlife, and commercial and consumer horticulture. A total of 304,381 extended learners were involved in this program area, and 9,712 volunteers who contributed 338,367 hours of volunteer time.

Virginia Cooperative Extension's Family and Consumer Sciences (FCS) programs, conducted by FCS Agents and Specialists, provided informal education that increased knowledge, influenced attitudes, taught skills, and inspired aspirations. Through the adoption and application of these practices, the quality of individual, family, and community life in Virginia was improved. During the reporting period, FCS brought faculty specialists, agents, and volunteer's expertise

together to address the needs and priorities facing Virginia's families. In the FCS program area, 46,998 extended learners were involved and 4,394 volunteers assisted with FCS, contributing 46,998 hours of volunteer time.

During the reporting year, Virginia 4-H programs reached 207,507 extended learners. Through a vast number of volunteers numbering 20,482, 4-H program efforts were supported and sustained. Volunteer commitment of these 4-H volunteers resulted in over 719,549 hours of volunteer time. Educational 4-H programs were delivered in context of 10 broad subject matter areas.

In the reporting year, educational programs in these three areas reached nearly 553,000 participants through a variety of delivery modes including conferences, workshops, home-study courses, web-based and other distance-delivered programs, public fairs, home/family shows, and exhibitions. A total of $14,640,350 external dollars were provided for the three program areas.

Key Themes

Aging

A review of literature by VCE faculty in Frederick County revealed that much of the elderly population is at risk for inadequate nutrition. Twenty-four senior adults participated in eight "As You Age" nutrition lessons. On a pre-post survey, 83% reported a positive dietary change by increasing their intake of fruits, vegetables, or milk products.

Ninety-eight Portsmouth senior citizens increased their knowledge of Diabetes Types I and II and learned the importance of eating properly as it relates to controlling their diabetes. Both oral and written evaluations revealed that many seniors were unaware of the health risks they were encountering and better understood how to choose more nutritious foods. It is estimated that these classes saved the Commonwealth approximately $1960.00 in co-payments and prescription drugs.

In five series of classes on fraud prevention for senior citizens in Arlington, 100% of participants were able to identify effective tactics for resisting telemarketers, warning signs that a telemarketer might not be legitimate, and places where fraud victims can turn for help.

Character/Ethics Education

Through the efforts of 4-H agents, trained volunteers, and State 4-H Specialists, 4-H has facilitated CHARACTER COUNTS! programs in over 55 localities across the Commonwealth. This effort has resulted in a program that represents the largest 4-H curriculum enrollment in VA - 87,147 youth. An evaluation instrument now in its third year of use was administered to an in increased number of elementary teachers who are using the CHARACTER COUNTS! program in their classrooms. This study continues to show significant positive behavioral changes in all six Pillars of Character by children enrolled in this educational effort.

Child Care/Dependent Care

Chronic Disease Prevention. Chronic disease in youth is growing in Virginia because the rate of childhood obesity is increasing. The state Department of Social Services Licensing division utilized Extension agents to provide training at 10 sites to child care providers. Response from one group of 34 in central Virginia indicated an excellent rating on the curriculum and trainers. Many indicated their desire to use the material immediately, including improving snack choices, games, and physical activity ideas. Additionally, state funding from the Department of Health/VCE specialist provided select pilot sites for childcare providers/preschool teachers to use fruit and vegetable resource kits with preschool aged children. Orange and Madison providers' pilot tested the kits with results assessed at the state level. Families, as well, participate in chronic disease prevention through educational talks/health fairs and a pilot newsletter project enrolling 150 families to receive the "Fit For Life" newsletter series. Basic cooking programs for youth age nine to 19 were conducted for 77 youth. Additionally, middle and high school youth in Orange County were surveyed (1,387 useable surveys) about lifestyle choices and thoughts about themselves. The community has been made aware of how teens view themselves and committees have formed to work on specific issues of concern.

Twenty-three childcare providers in PD11 participated in one of two, two-hour training sessions offered in the "5 A Day" Nutrition Education pilot program. The pilot program involved the use of two educational kits (fruit and vegetable) that included books, educational toys and visual aids along with an activity and reference guide. Of the 23 providers who were trained to use the kits, 11 used the kits with the children in their care (each kit was used six times, with one provider using both kits during the pilot). Evaluations of the kits and activities indicated that they were effective when teaching young children nutrition concepts, helping deliver nutrition education programs, helping children to learn healthy nutrition habits, and encouraging children to try new fruits and vegetables. Childcare providers stated that when using the kits, children would eat more fruits and vegetables than they usually did and that parents commented to them that their children asked for foods (including broccoli) that they had never eaten before.

Childcare Training. Two, four-hour childcare provider trainings, "Potpourri for Providers," were conducted to provide the necessary training for providers in the Lynchburg area to maintain their state license. A total of 209 childcare providers in PD11 attended the two training sessions participating in workshops including working with children who have AD/HD, exploring art through paint, childhood asthma, conducting childhood assessments, working effectively with parents, phonemic awareness, appropriated teacher-child interactions, and healthy snacks. Pre and post-tests for each break-out workshop indicate knowledge gains ranging up to 38%. Providers reported many practice changes they planned to make as a result of their participation in the training including: "let children do their own art work," "use checklists with children who have AD/HD," "work on my art area," "stick to a routine," "sing more and play more nursery rhymes," "to have a better partnership with parents and continue communication," and "to work together as a team (of teachers)."

Virginia State University conducted four training programs for 150 child care providers on the following topics: 1) discipline of young children, 2) school readiness – what children need to know to start school, 3) activities for learning math, colors, numbers, and shapes, and 4) active

times, quiet times – making transition easier. Evaluation of the programs indicated that participating child care providers obtained greater understanding of the topics.

As a result of participating in the What Children Need to Know to Start School workshop in Culpeper County, 16 childcare providers/early childhood educators reported learning new information that was relevant to their work and planned to adjust practices to reflect the new knowledge. The workshop was repeated for twelve staff members of a local pre-school who developed a plan to adjust their practices to reflect current findings in needed school readiness skills.

As a result of programming and acquisition of funds to assess Resource and Referral services in the area of Child Development and Quality Childcare Education ($11,629), ten counties in the Middle Peninsula and Northern Neck of Virginia are being mapped to determine location of providers, types (centers/family/faith-based) of providers, services offered (sick child/overnight/weekend) and qualifications of providers (CPR trained, licensed, etc). This on-going project will provide the statistics necessary to direct future programming, recruitment and training to help fill the existing gaps in service and quality. This is an initiative connected to the entire state system of childcare which gives Extension programming visibility, validity and links our educators with a wider support system.

Children, Youth and Families at Risk

Tobacco Use. The Tazewell Extension Office received a Grant through the Virginia Tobacco Settlement Foundation to teach Skills for Adolescence, and Character Counts!, to at Risk Middle School Students. This program gave each student the opportunity to have one-on-one, focused time with a trained technician to help them make wise decisions about life and the use of tobacco. The students completed a 12 week mini course in school and visited Virginia Tech's Biotechnology Lab to learn about new harmless uses for tobacco. The program was completed with a retreat at the 4-H Educational Center where the students learned about Trustworthiness, Respect, Responsibility, Fairness, Caring, and Citizenship. Pre and post test evaluations were conducted and analyzed by The University of Richmond. There was a tremendous improvement in the confidence the students had to being able to make wise decisions and the ability to educate their peers of why they chose not to use tobacco. The 104 Students completing the program have pledged to be smoke free and have shown evidence an increased appreciation for their Character.

Money Management. A money management series was conducted in Alleghany County, using the "Consumer Jungle" curriculum for students in the Regional Alternative Program. This was a coordinated effort between the two local school systems to address the educational needs of teens unable to remain in the mainstream system due to disciplinary, substance abuse, or parenthood issues. Topics included in the program were: Money Management Behavior Assessment, Advertising Gimmicks, Credit Issues, Checking Accounts, "First Home" Set-up, and Tax Reporting. Seventeen students participated in eight hours of instruction, discussion, and group assignments. By the end of the series, approximately 90% of the students indicated an understanding of the material, were much more responsive and receptive to the sessions, and demonstrated a willingness to participate in group discussions.

Nutrition. Seven programs on "Healthy Living" were developed and delivered to 271 predominantly low-income, minority men and women in Mecklenburg County. The participants learned ways to incorporate healthy habits into their everyday living to improve their health. The assessment of knowledge learned was an average of 43% measured by pre- and post-testing. Sixty (22%) of the 271 participants surveyed adopted at least two of the recommended practices of increasing fruits and vegetables to five per day, decreasing sodium intake, and decreasing fat/calorie intake.

Thirteen low-income, high-risk participants in Mecklenburg County enrolled in "The Great Team" project. The goal was to introduce a healthy lifestyle through nutrition education, self-esteem building, and physical exercise. All participants (100%) indicated an improved ability to plan menus and choose healthy foods from the Food Guide Pyramid and Dietary Guidelines. Ten (75%) wrote personal plans to adjust physical activity for health and weight control. Eight (60%) improved their intake of fruits and vegetables. Seven (50%) implemented a plan to increase physical activity, walking at least three times per week for 30 minutes.

Communications Skills

As a result of participating in 4-H Presentations, 548 Lee County 4-H members gained experience in public speaking skills, organization skills, and the ability to develop a main idea into a step-by-step process. Twenty four of those members participated at the district level. As a result of participating in Share-the-Fun, four junior members and two senior high members gained self-confidence and communication skills. Because of their gained experience and knowledge of public speaking, the senior members placed 1st in the Combination Category at the state level.

One hundred sixty-nine Prince Edward and Buckingham County youth participated in classroom 4-H presentation contests. Seventy-eight percent (131) of the youth indicated that, as a result of participating in the presentation contest, they were better able to speak in front of a group. Seventy-six percent (128) indicated that they were better able to gather information and supplies necessary for showing and telling how to do something, and eighty-two percent (138) indicated that they were better able to teach and show others how to do something.

Nine hundred thirty-one Scott County youth participated in the club Public Speaking Contest. Thirty-nine 4-Her's participated in the county contest. Sixty percent have improved their skills in collecting and organizing information. Seventy percent learned to develop communication skills by understanding the principles of public speaking through the delivery of a speech on a chosen topic. Several parents who attended the county Public Speaking contest thought this was a wonderful opportunity for the youth and they couldn't believe the quality of the speeches. They said, "This is a life skill and we want to thank 4-H for providing this learning experience."

Family Resource Management

Teen Financial Management. Fifteen teen youth participated in a "Welcome to the Real World" day camp held in July of 2002. Two banking firms, one insurance company, Halifax 4-H, and the Halifax County Public School system hosted the three-day camp. Teens first learned

how to make career choices and then received a starting paycheck, after taxes. The "Real World" portion involved the teens being dealt a debt or asset in which to deal with. Teens then learned about automobile insurance and credit. One hundred percent of the participants learned how to write a check correctly, how to balance monthly bank statements, and how to make wise financial choices. One teen stated he would "be careful to always know the amount of money in his checking account in case of unexpected bills." Forty percent of the teens involved now have their own checking accounts.

A six week after school program was developed and implemented in Prince Edward and Buckingham Counties, with lessons and activities focused on budgeting, banking, credit, and investment basics. Five of the six youth completed an evaluation at the end of the program. Each was able to successfully write a check. Four were able to name at least one type of investment and to describe one thing that they could do to maintain a good credit rating.

Eighty High School Seniors in Northumberland County, increased their knowledge and skills of good money management by participating in a three part money management program. As a result of the program, the seniors developed a spending plan for their senior prom. Most were able to stay within their budget and all expressed a greater understanding of budgeting, credit and saving.

Financial Management. Fifteen inmates and 20 low income families in Northumberland County are now able to manage their money better. These 35 family members participated in a three part Money Management Series designed to enhance their skills in budgeting/record keeping, credit/debt management and saving. One-hundred percent of the family members developed a spending plan and a savings plan as a result of this program.

In Floyd County, there are now a total of 65 Individual Development Account (IDA) program participants. One-hundred percent have opened savings accounts and have collectively saved $45,149. Five (7%) have developed a debt reduction plan that would enable each to save 30 months in time required to pay down their debt. In addition, three have started businesses and five have purchased homes.

Thirty-three basic financial skills workshops were offered to a total of four hundred twenty (420) Peninsula residents. Of that numbers 61% (256) reported increased ability to save money, track spending and evaluate consumer goods and services prior to purchase.

Twenty-five (25) Lee County residents enrolled in the Managing Your Money Home Study Course. Eight returned the participant survey (32%). Six (75%) indicated that as a result of the program they planned to begin setting short and long term goals-- something they had not done before. One individual stated that she had enrolled in the course in order to help her young adult children, recently married, to "start out with good, sound financial planning [to give] them a sense of security and control." She indicated the lessons had helped a great deal. Another response from a couple in their seventies was "appreciate an opportunity to study and treasure these lessons...have been so valuable to my husband and me, our file cabinets and record keeping shall be better organized and less cluttered. Throwing away things will be easier."

A workshop for residents of a housing project in Danville on personal financial management was conducted. Registrants are participating in the VHDA Homeownership Education program. Eighteen participants attended the budgeting workshop. All 18 of the participants returned their evaluation forms and all indicated that they had learned new information that would enable them to better manage their money as a result of attending the workshop. Likewise, all 18 (100%) indicated that they were planning to implement the following changes in their current financial management practices: 17 (94.4%) reported that they plan to evaluate how money is spent; 17 (94.4%) report that they plan to pay bills on time to avoid paying interest and maintain a good credit rating; 15 (83.3%) plan to start a savings account or regularly add to their current savings account; 13 (72%)plan to develop a family budget; and, 13 (72%) plan to start or increase a family emergency fund.

Virginia State University Extension faculty partnered with Virginia Housing Development Authority to conduct a series of intensive Homeownership Education Classes to 138 local participants. The six-hour classes offered sessions on making your budget work; credit and credit issues; working with a realtor; role of the lender; loan closing; and home inspection. The classes were held on Saturdays, once per month, for eight consecutive months. The 138 participants evaluated the classes as follows: 13 will develop a budget to keep track of expenses; 14 will begin to save money regularly; 13 will begin an investment program; 15 will continue to learn about personal financial issues; 14 will improve personal record-keeping; 15 will pay bills on time; 14 will organize their financial records; 15 will reduce credit card debt; 14 will reduce spending habits; 11 will review their insurance policies; 13 will review their estate plans; 13 will set financial goals; and eight will talk with their spouses and family members about financial issues. Approximately 25 participants have purchased homes as first-time home owners.

Agricultural Financial Management

Livestock Profitability. VCE Agents developed and facilitated a one day Livestock (Beef) Profitability developmental educational program for 14 Page County and other producers. This intensive session featured the use of scenarios, budgets, small group work and lecture to help producers make management decisions that directly affected the return to land labor and management of the overall budget. Evaluations returned by participants revealed that this program was extremely well received and that 66% of the producers either had already implemented or planned to implement changes or use information that they learned through the course in their own operation. This course will be offered again in other locations throughout PD 7.

Logging. Ninety-eight loggers and forestry professionals improved their knowledge of business management skills at three short courses titled "Giving Loggers the Business." Eighteen loggers learned ways to minimize income and estate taxes as part of their business management plan. Twelve Virginia DOF county foresters learned why it is important to consider taxation consequences of timber activities prior to recommending a management event.

Farm Business Management. Through the efforts of VCE's Farm Business Management Specialist, the Farm Management Update Newsletter received more than 40,000 hits as counted on the VCE web site and more than 15 articles were picked up by statewide, regional, and

national publications. One-hundred sixty farmers in Southwest Virginia gained knowledge of leasing and economic principles of land leasing in four workshops. Two-hundred fifty farmers and professionals gained knowledge of economic principle of forage economics including value of hay, how to determine storage costs, returns from stockpiling fescue, and machinery investments in forage production.

As a direct result of numerous economic presentations made to lenders, agricultural producers, and non-farming landowners across southeast Virginia, 81 farm business enterprise plans for clients seeking financial analysis have been completed. Sixty-three clients stated their lenders informed them they would have to get direct input and recommendations from Extension regarding their farm plans before they would be able to go forward with their operational plans. Seventeen of those clients were able to negotiate lower interest rates on their operating loans as a result of having a written farming plan. The interest savings to the farmers will be in excess of $123,000.00 over the next seven years. All eighty-one farmers have negotiated a lower cash land rent charge to their farming operations. The lower rents come to a net aggregate farm savings of $4,212,000.00. As a result of educational counseling with representatives from the peanut shelling industry production contracts have been offered averaging a net $50.00 per ton over contracts in other areas of the United States. Sellers and retailers indicated that they need approximately forty-five thousand tons of peanuts to meet retail needs. That represents a net increase in contract offerings to Virginia peanut producers of $2,250,000.00. An acceptably reasonable method to calculate tax basis of peanut quota was formulated. Three hundred twenty-one contacts were received specifically to get this information. The method eliminated over $1,524,750.00 of taxable gain for these clients who received peanut quota buyout income as a result of FSRI 2002.

Virginia Quality Assurance Program. Achieving profitability continues to be a challenge for Virginia farmers. In particular, many beef producers in Southwest Virginia are not benefiting from good beef management practices because they have to sell their cattle on the general market. On the general market, good cattle are sold together with the bad; therefore, the producers do not receive premiums for their higher quality cattle. In an effort to improve profitability through marketing, the Virginia Quality Assurance (VQA) program was implemented for beef producers in Bland, Giles, and Wythe counties. To participate in the VQA program, certain beef management practices had to be followed and certified. By doing so, the VQA program allowed beef producers that practice good beef management to sell their cattle together as opposed to on the general market. One-hundred percent of the cattle sold in the VQA program brought more than the average for state graded weekly feeder cattle sales for the same week with premiums ranging from $1.69 to $30.64 per calf.

Farm Policy. Farm policy is critically important to Virginia farmers. In FY2000, 7,972 Virginia farmers received $213.1 in price support, income support, and crop insurance indemnification payments. With passage of the 2002 Farm Bill, Virginia producers and agri-business service and product providers need up-to-date information and analysis in order to make the best choices. A spreadsheet decision tool was used in Congress during development of 2002 peanut provisions, and also to help Virginia peanut producers estimate farm-level economic implications. Educational materials on Farm Bill 2002 were prepared with a national Extension team. A train-the-trainer conference was co-developed in Georgia for 35 regional Extension educators.

Virginia Extension agents, dairy producers, grain farmers, peanut farmers, and service/product providers were trained. Virginia agricultural producers, Extension agents and agricultural service/product providers were better informed about provisions of the 2002 Farm Bill. Of the Virginia farmers who made a choice concerning commodity program base acres and updated yield, 57.2% used the educational products available, analyzed their options, and chose to update program acres and yields, as opposed to 42.7% of all US producers. The Farm Bill Extension program team was awarded the USDA Farm Service Agency Administrator's Award for our Farm Bill education program.

Risk Management Tools for Agribusiness Professionals. Virginia State University provided leadership in a collaborative effort with the Center for Farm Financial Management at the University of Minnesota and the National Crop Insurance Services obtain a grant from USDA-Risk Management Agency. The purpose of the grant was to conduct training and provide educational materials in risk management tools for agribusiness professionals with responsibility for providing outreach and assistance to under-served agricultural producers to be successful. The objective was to equip educators to provide high quality, knowledgeable risk management education and assistance to underserved producers regarding crop insurance tools, financial management tools and business planning tools. Specifically, the program taught educators and consultants how to help underserved and limited resource producers 1) develop balance sheets, budgets, cash flow plans, 2) understand how to evaluate alternative strategic plans for the farm, including how to evaluate ownership options, 3) develop loan requests, and develop FSA forms to apply for FSA loans, and 4) understand, access, and use Risk Management Agency subsidized crop insurance programs. The three regional workshops were conducted in Virginia, Louisiana and New Mexico during the months of April and May, 2003. Each participant received a crop insurance handbook, a FINPACK training manual, a copy of the FINPACK software, a copy of the FINPACK Business Plan software, and a copy of the FSA Forms software. Participants in the workshops came from 22 states plus Puerto Rico and the Virgin Islands. The 96 participants represented: 15 1890 Universities, one 1994 University, four 1862 Universities, 11community based organizations serving Hispanic, African-American, women or other limited resource producers, eight other organizations including departments of agriculture, community colleges, private colleges, and the Bureau of Indian Affairs. Participants represented six organizations that specifically serve Hispanic producers and four that specifically serve Native Americans. The feedback and evaluations from the 96 participants of the workshops was very positive. Participants were asked how many producers they reach annually with educational programs. Collectively, they reported that they and their institutions programs serve 22,309 producers annually. They further reported that they expected to directly use the materials they received at the workshops with more than 1,900 under-served producers as a result of attending this training session.

Small Farms Technical Assistance. Virginia State University Cooperative Extension faculty and agriculture management agents conducted the small farm technical assistance and outreach program in more than 40 counties. Educational programs provided information; training and technical assistance in agricultural production, business and financial management, agricultural risk management and USDA farm programs for small, limited resource and socially disadvantaged producers in the targeted counties. Over 5,000 contacts were made with individuals through farm visits, workshops, group meetings, farm demonstrations, field days,

phone calls, direct mails and other methods during the year. As a result of the program, more than 75% of participating producers indicate that they are making more timely and informed production, marketing, financial and business decisions. In a recent research to evaluate program impacts, it was determined that the program significantly increased net farm income ($4000 - $12,000+/year) for the average participant. It was further determined that the benefit increased with the intensity of participation in the program.

Home Safety

Seventy citizens participated in the Your Family Disaster Plan workshops. Virginia Cooperative Extension is in the process of conducting a follow-up evaluation of these participants. Thus far, 11 participants have returned a follow-up evaluation. Of the 11 participants who have responded to date, all 11 (100%) indicated that they learned a majority of the following concepts: how to prepare a family disaster plan; what supplies should be included in a disaster supplies kit; why our family should have two meeting places and an out-of-state telephone contact; some steps to take during and after different types of disasters; the types of disasters that are most likely to occur in our area; what to do if instructed to shelter in place, how to disinfect water, and how to tell whether food is safe to eat. All 11 (100%) of the respondents indicated that as a result of the program they had taken at least three of the 12 recommended emergency preparedness actions listed on the survey. Seven (64%) of the respondents indicated that they had taken five or more of the 12 recommended actions listed. Recommended actions included the following: developed a disaster plan; picked two meeting places for emergencies; asked an out-of-state family member or friend to be our check-in contact; assembled a disaster supplies kit; stored emergency water supplies for all family members; stored emergency food supplies for all family members; made arrangements for the care of family pets in the event of a disaster; created an escape plan for our home; conducted a home hazard hunt; checked to be sure the batteries in our smoke detectors are working; learned about the disaster plans of places our family spends time (such as school, child care, work, nursing home); and, discussed this topic with others in our neighborhood. Eight (73%) of the respondents indicated that they now feel more confident about their ability to cope with a disaster.

Jobs/Employment

The 4-H Lawn Mowing project in York County is in its second year and continues to be successful and visible to the public. It is an educational program involving youth ages 10-15 to gain knowledge of turfgrass maintenance, and the discipline of business and marketing. Public response has been positive for the first two years of the 4-H Lawn Mowing Training program. Participants who complete the program are invited to allow the Cooperative Extension office to contact them when citizens ask for a referral for a youth who provides lawn-mowing services. This is a non-traditional 4-H special interest group that leads youth to other activities in 4-H. Eight youth have become involved with teen counselors leadership roles at 4-H camp. Two youth have joined local community clubs. After lawn mowers were put away for the fall, we evaluated the students. We graduated 30 youth from the program in the two years. Six students began a lawn mowing business. Written surveys and personal contact indicate that Extension practices were observed. Their businesses were profitable with an average monthly income of $175.00 per month. Eleven participants are involved with cutting the family lawn. Again these

students are practicing Extension recommendations. Five students did not pursue a business and are not involved with cutting the family lawn. The remaining eight participants did not respond. In 2003, the National Association of Counties recognized this program.

The 4-H Chrysanthemum Growing program has been organized for several years. The 2002 impacts of the program indicate the success of the youth through their marketing and bookkeeping skills. Their product is very high in quality. The evaluation indicates that 19 participants sold 92% of their crop by September. The average sale price is $2.50. Each participant paid $1.00 per pot. This indicated that their profit margin is over 100%. In 2000, the program was the National Finalist in Search for Excellence Award with the National Association of Counties.

Parenting

Louisa County Extension continued to receive referrals from judges, social workers and lawyers in the planning district for people in custody and visitation cases to attend the Living Apart Parenting Together workshops. Two volunteers have served as guest speakers, assisting in teaching different components of this program. A total of 86 hours of instruction was given to 53 participants. Evaluations have shown that 50% realized they were often not thinking about consequences before reacting in conflicts. One judge and two lawyers have verbally commented that they have observed attitude and behavior changes in the clients. After this workshop, over half of the disputing parties were more willing to compromise and their feelings were more in control in the courtroom.

Sixteen Petersburg parents participated in the Positive Parenting Program. The individuals increased their parenting capacity by knowledge gain of thirty-two percent from the pre-test scores to the post-test scores. As a result of the class, sixteen families with thirty-four children remained intact or will be reunited with a cost savings of $140,880.00 for one year to the Petersburg Department of Social Services.

During the 2003 program year, 167 parents and relatives as parents completed the Living Apart, Parenting Together program in Culpeper. Of these, 83% agreed or strongly agreed that the course provided ways to help their child adjust to the separation, 88% reported an increased awareness of the effects of separation and conflict on children, 92% of the participants gained insight into the how and why parental conflict creates stress for children, 87% reported an increased understanding of why children need and want a healthy and meaningful relationship with both of their parents and gained ideas of how to successfully share in the parenting of their children, and 88% reported they obtained information to help them recognize when their child may be experiencing emotional problems, how and where to seek professional help, support and access to community resources.

Three Becoming a Love and Logic Parent courses enabled a total of 54 Shenandoah County participants to learn effective parenting strategies. Of the 17 participants completing the evaluation 100% improved their parenting knowledge and 15 (88%) indicated that they feel more confident about their ability to handle behavior problems as a result of the program. In addition, all respondents made one or more improvements in the way they interact with children and nine

(53%) indicated that their children's behavior had improved since they began applying these parenting principles. Participants listed numerous examples of problems they has solved with their children such as anger management, homework, sibling rivalry, back talking, getting ready in the morning, and getting children's' rooms clean. Overall, volunteers contributed 113 hours of time to VCE parenting programs in our area during the year.

Promoting Business Programs

The implementation of an electronic village in King & Queen County not only provided a means of communication across the County; it opened avenues focused on rural economic development. Communication is a major problem in this 100% rural county, something that has not been able to be addressed before now. With 30+ community residents giving direction to its development, the site reflects the atmosphere of the region and encompasses needed information identified by residents. The Take Charge process was utilized to identify issues/needs to be addressed - this information gave basis to offer an Agri-Tourism Conference. Of participants, 72% indicated they learned ways to determine the opportunity that would be best for them to pursue, 48% intend to go forward with their business development, 12% already having a business indicated plans to move forward with expansion. Participants indicated a need for training in the development of a business plan. As a result of the Developing a Winning Plan workshop, 54% of participants indicated this as a first encounter with VCE programming; 100% learned the purpose of a business plan; 92% learned how to conduct a market analysis; 77% felt comfortable with compiling financial data; 85% indicated they learned more about how to seek financial support; and, 53% indicated they were prepared to start writing their business plan. With the web site only available to the public for one month, positive reports have been received. Business listings rose from 37 to 112 in three weeks. Citizens report viewing the calendar to see what events are occurring across the county and they are finding and utilizing previously unknown local businesses - keeping the money local and boosting the local economy. Additional funding ($2,000) will establish a special web page and link for latchkey children (and others) to homework help, SOL-related games and links to resources and information.

Supplemental Income Strategies

Ginseng Production. There are 12 million acres of privately owned woodlands in Virginia. These forest lands are used for production of lumber but timber sales do not really produce substantial income. Landowners often pay more money out in property taxes, for forest land, over a 40 year period, than they receive when they finally sell the timber from it. One way landowners can increase their income from woodlands is to establish naturalized populations of American ginseng (Panax quinquefolius). Market demand for the fresh and dried roots of American ginseng is quite strong in the United States, in Europe and especially in China. VCE research is focused on 1) investigating the economic costs and returns of wild-simulated American ginseng in Virginia, 2) investigating the growth requirements of American ginseng in regard to soil nutrients and site selection, 3) investigating the control of pests including slugs, voles and deer, and 4) investigating the control of human theft. Ginseng production research and demonstration plots have been established on 20 different farms in 14 different counties of Virginia to test crop responses to various soils and forest environments. Educational field programs have been held at six of these sites to teach landowners about this enterprise. A

publication entitled Producing and Marketing Wild Simulated Ginseng in Forest and Agroforestry Systems has been distributed through Extension Offices across Virginia. Over 400 Virginia landowners have established production of American ginseng as a new enterprise for supplemental income. Most of these growers have started on a small, careful scale. The average level of production is only one acre of ginseng. Average annual yield for these small-scale ginseng growers is about three pounds of dried roots. At $400 per pound, that's an additional $480,000 in farm income added to the state economy.

Cut Flowers. Over 90 % of the cut flowers sold in wholesale and retail markets in Virginia are grown outside of the state. American growers generally cannot compete with low cost labor in Colombia, Ecuador and Costa Rica in production and harvest of roses, chrysanthemums and carnations. Strong market demand exists, however, within the floral industry for specialty cut flowers that do not have a long enough shelf life to allow wholesale shipments from foreign countries. VCE research is focused on 1) investigating the economic costs and returns of cut flower production in Virginia, 2) investigating the market demand for specific cut flower species in Virginia, 3) investigating the effectiveness of non-chemical and chemical controls of weeds, insects and diseases in cut flower crop production, 4) investigating methods of field management to enhance yield and quality of cut flower crops, and 5) investigating methods for post-harvest handling of cut flowers. Research and demonstration plots have been established at Virginia State University's Randolph Farm and on 16 private farms throughout Virginia. A publication entitled Growing Everlasting Flowers: A Beginners' Guide has been distributed through Extension Offices across Virginia. A grant from the Sustainable Agriculture Research and Education program of USDA entitled, Financial Analysis and Test Marketing of Cut Flowers, has generated financial budgets and real market analysis information for cut flowers for the first time in Virginia. Two Cut Flowers Field Day programs were conducted in association with that grant. Over 200 Virginia farmers have established commercial production of cut flowers as a new farm enterprise. These beginning cut flower growers sell an average of $5,000 of cut flowers each year. Their combined sales have contributed $1,000,000 in farm income to the state economy.

Organic Vegetable Production. Many small farmers in Virginia attempt to earn income through production and marketing of vegetables. Many small-scale farmers, especially in rural areas, lose money in conventional vegetable production due to low prices. It is very difficult for a small grower with five acres of crops to compete in the same markets with growers who raise vegetables on 300 acres of land. Economies of scale favor the large-scale growers. Organic certification is an excellent way for small farmers to separate their vegetable crops from the crops grown by large-scale, conventional growers. Premium prices are often paid for certified organic produce. VCE research is focused on 1) investigating the economic costs and returns of organic vegetable production in Virginia, 2) investigating the effectiveness of non-chemical controls of insects and diseases in vegetable crop production, 3) investigating the effectiveness of using cover crops, compost and other organic fertilizers to maintain soil fertility. Organic research and demonstration plots have been established at Virginia State University's Randolph Farm. Over 190 landowners attended the Virginia Biological Farming Conference in 2003 to learn about production and marketing of organic crops. Fact sheets on organic production of specific crops such as blackberries and watermelons have been distributed through Extension Offices across Virginia.

Wine Grapes. Identifying potential alternatives and supplemental enterprises in today's agriculture environment continues to be a challenge. This past year, an effort was made by working with nine individuals, four of which are tobacco producers, in looking at wine grapes as a potential agriculture opportunity on their farm. Four of these producers are from Charlotte, two are from Lunenburg, one from Mecklenburg, one from Sussex and one from Nottoway. On-site visits with these clients were made and two vineyard tours were conducted with these interested producers. As a result of these efforts, two of these producers have established a vineyard and three more will be planting this spring. The potential return per acre for this enterprise is well over $2000 when in full production. At this point in time, we now have three vineyards established and two being planted in Charlotte County that will bring around 30 acres in grape production.

New Farmers Education Program. A diverse group of new and beginning farmers is appearing in the Virginia agricultural scene. Many are retired professionals who are looking for a simpler life in the country. A number of young, college-educated couples are buying small farms with intentions of generating income from farming to support family living expenses. Some African-American families are returning to farm on inherited properties as dual careers. Also, several factories have closed their doors in rural Virginia towns leaving displaced workers some of whom are interested in pursuing farming and agriculture related careers. These beginning farmers need to acquire skills in production, marketing and farm business management to enable them to succeed in farming. Virginia State University conducted conferences, local meetings, field demonstrations and individual consultations by phone, mail and farm visits to help provide the needed education. Farmers received instruction in basic production skills such as soil testing, field preparation, farm safety, controlling pests, how to use trickle irrigation, variety selection, planting seeds, livestock management, correct stage for harvest, finding sources of supplies, etc. Additionally, farmers received basic instruction in farm business management, such as, developing business plans, pricing for profit, market development, record keeping, labor management, preparing loan applications, financial analysis and tax management. A survey of participating farmers showed that: over 100 beginning farmers developed business plans for their farming operations; many farmers established trickle irrigation systems. Sixty beginning farmers earned average net income of $4000 from marketing vegetables. Forty beginning farmers earned average net income of $6000 from marketing fresh cut flowers. Forty beginning farmers established naturalized populations of American ginseng and/or goldenseal in their privately owned woodlands. Twenty beginning farmers established commercial production of shiitake mushrooms as a new enterprise. Eighty beginning livestock farmers earned average net income of $4000 marketing pastured poultry, organic eggs, organic beef or pastured pork. Ten beginning farmers were approved for USDA loans. Ten beginning farmers participated, for the first time, in USDA conservation cost-share programs.

Caged Trout Production. Through research and educational programs conducted by Aquaculture Program at Virginia State University, limited resource farmers have been introduced to cage culture production techniques for raising trout from the fall to spring season. Winter caged trout production is currently an accepted practice in the Piedmont Region on Virginia. In addition, small farmers have been provided information on potential profits to be made using small ponds to raise koi carp, a small ornamental fish produced with minimal labor and capital, which then are stocked in home and commercial display ponds, and water gardens. Producing

caged trout during the winter and selling them in the spring allows small farmers to continue producing their traditional crops without time conflicts in the spring. Selling the trout in local markets, they are able to earn, on average, $1,000 in additional income annually. Pond spawning of koi carp, which can produce up to 2,000 fingerlings per acre annually, and can produce $2000+ extra income per year.

Youth Development/4-H

Japanese Exchange Program. The Virginia 4-H program increased the number of Japanese summer exchange delegates, VA 4-H outbound delegates to Japan, and High School exchange students in our state program from the previous year. These results were due to the efforts of three volunteer program coordinators, an Extension specialist, Extension agents and volunteers. Host family members and youth as well as our international visitors overwhelmingly report an increased understanding and acceptance of people of a different culture.

Natural Resources. Extension leadership council members and forest industry professionals had requested that Extension do more to educate youth about the importance of Virginia's natural resources. In this spirit, $645 in scholarships was secured to sponsor schoolteacher attendance on the 26th Annual Fall Forestry and Wildlife Bus Tour. Thirteen elementary, middle, and high school teachers from Charlotte and Halifax Counties joined 52 forest landowners and natural resource professionals for this eight hour tour. As part of the tour, each teacher was provided with a package containing information and resources designed to assist him or her with teaching Virginia's natural resource related SOL's. Written evaluation comments included "Very good, informative, and good resources for teachers." Agent and volunteers have raised $4,617.50 to support the attendance of 60 schoolteachers on bus tours over the last three years.

Financial Management. 154 youth in Planning District 9 participated in the Reality Store Financial Simulation in which teens are given opportunities to make real world financial decisions. One-hundred nine participants completed evaluations with responses as follow: 62% indicated increased understanding in basic budgeting; 61% indicated increased understanding in the importance of making wise financial choices; 42% indicated increased understanding of the expenses that children incur. As a result of participating in the Reality Store, 42% indicated that they would now save and plan more for unexpected expenses

Watershed Education. As part of the Virginia Department of Education Watershed Education Initiative, the 4-H Marine/Aquatic Education Program at Virginia State University conducted an 18-hour watershed education program for 19 seventh graders at St. Joseph Middle School in Petersburg. Students participated in six hours of classroom instruction in watershed structure and function, Virginia water resources and water quality measures. Students also participated in field trips to a hydroelectric dam, waste water treatment plant, managed recreational and water-source lake and exploration of the Appomattox River. Students rated the program 4.38/5 overall and pre-post tests indicated a 55% increase in knowledge and understanding of water resource issues and processes. Evaluation comments included: "The field trips were fun and I did learn a lot I didn't know; other classes should do this; and it was exciting." The project was funded through a Watershed Classroom grant from the Virginia Resource Use Education Council.

The Reality Store. Virginia State University's Cooperative Extension/4-H Youth Development Program conducted the second annual Youth Development Seminar at Virginia State University. The seminar focused on a simulated program called "Reality Store." The purpose of the Reality Store simulation was to show youth the relationship between their educational attainment and their long-term goals. Eighty-nine participating youth were given the opportunity to simulate "real life" financial responsibility and decision making. Each youth was randomly assigned an occupation and an annual salary. Next, each youth was allowed to visit 19 booths that represented various services and associated expenditures such as housing, transportation, child care and health/medical care to make consumption and savings decisions based on the income constraint imposed by their assigned occupation. The majority of participating youth indicated in the post seminar evaluation of the program that they learned valuable lessons they would use in the future. They also indicated that the simulation really made them think about the types of career choices they need to make in the future.

Government. Virginia State University hosted 4-H Day at the State Capitol in Richmond, Virginia on Thursday, February 13, 2003 to expose 4-H youth to governmental processes in the state of Virginia and to develop and interest in state government. This program is designed to expose 4-H youth between the ages of 13 -17 to Virginia's governmental processes in action. During this day, youth across the state of Virginia visit the General Assembly in Richmond to learn about the governmental process, visit with their local legislators at the General Assembly, observe legislation in action at the State Capitol, and tour the buildings where major legislation is decided in Virginia. Prior to legislative visits and tours, 180 4-H youth participated in an in-depth orientation session. A major focus during the orientation session was spent learning about opportunities to work during the General Assembly as congressional pages, the process of applying to serve as a page and contact information for those interested. In 2003, four youth who participated in the 2002 4-H Day at the Capitol orientation session are now successfully serving as Congressional Pages in the state of Virginia. Three specifically indicated that their participation as congressional pages was due to the interest and excitement generated during the orientation session at Virginia State University sponsored 4-H Day at the Capitol. Each of the four 4-H youth serving as congressional pages are currently planning to be involved in law and/or education and are ultimately interested in becoming a state or national legislator.

Funding and FTE’s

Extension Funding

Year	Federal	State	Local	Other
2000	3,562,736	9,954,717	1,787,360	1,511,685
2001	3,669,618	10,253,359	1,840,981	1,557,036
2002	3,779,707	10,560,960	1,896,210	1,603,747
2003	3,893,098	10,877,789	1,953,096	1,651,859
2004	4,009,891	11,204,123	2,011,689	1,701,415

Research Funding

Year	Federal	State	Local	Other
2000	902,000	1,647,000	0.0	607,000
2001	929,000	1,696,000	0.0	626,000
2002	957,000	1,747,000	0.0	644,000
2003	986,000	1,799,000	0.0	664,000
2004	1,015,000	1,853,000	0.0	684,000

Extension FTE's

Year	Professional			Paraprofessional		
	1862	1890	Other	1862	1890	Other
2000	141.5	7.0	0.0	8.9	12.0	0.0
2001	136.9	4.8	0.0	30.0	12.0	0.0
2002	128.4	4.7	0.0	31.0	12.0	0.0
2003	102.6	3.7	0.0	2.0	12.0	0.0
2004	141.5	7.0	0.0	8.9	12.0	0.0

Research SY's Only

Year	1862	1890	Other
2000	8.8	0.0	0.0
2001	8.9	0.0	0.0
2002	9.0	0.0	0.0
2003	9.1	0.0	0.0
2004	9.2	0.0	0.0

C. Stakeholder Input Process

For many years, VCE had a network of county/city advisory committees that were expected to give input on programs and assist in issues identification. Inadequate attention was paid to the development of these committees, and their effectiveness began to erode. In 1994, VCE restructured its umbrella Virginia Cooperative Extension Leadership Council (VCELC) and developed a new system of local Extension Leadership Councils (ELC's) designed to be in place in every county and city cooperating on extension programs. Very specific guidelines and indicators of quality were developed for these councils to ensure that the citizens led the councils and provided the appropriate input on issues, program needs, evaluation, and funding of research and extension programs. These councils, under the umbrella of the VCELC, are critical to the ability of extension and research to design and direct their efforts to meet public needs. In addition to the state ELC and the local ELC's, program leadership councils for all three major program areas involve citizens and staff in more in-depth analyses of needs and program design.

The following is information on the groups that were active during the reporting period to ensure that Extension and research receive adequate stakeholder input on issues, programs, and the use of federal formula and other funds:

Extension Leadership Councils

The formalized means through which Virginia Cooperative Extension (VCE) establishes connectivity with the grassroots of the state is 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 Community Sciences, and Agriculture and Nature Resources), community leaders, and other organized community entities, which are natural partners for VCE. Extension staff and Leadership Council members work as equal partners to determine needs, establish program priorities, plan and implement solutions, identity and secure resources, market VCE and its programs, evaluate, and report program results/impacts to program stakeholders.

At the state level, local connectivity is achieved through the Virginia Cooperative Extension Leadership Council (VCELC). The partnership is composed of volunteer leaders representing the 22 planning districts of Virginia, at-large members appointed by the director and administrator, all VCE District Directors, all chairpersons (or designees) of the VCE program leadership councils, (FCS, 4-H, ANR), the VCE Director (Virginia Tech), the VCE Administrator (Virginia State University), the designated VCE staff from both Virginia Tech and Virginia State University, the 1862 director of the agricultural experiment stations, the 1890 director of research, and the director of governmental relations at Virginia Tech.

Currently, all 108 of Extension units in Virginia report having an organized ELC. In 2001, all the Extension Agents with primary responsibility for the functioning of the local Extension Leadership Council and the Chairs of each of the organized councils were surveyed to determine how local councils were functioning. The results of the survey indicated that of the 96 ELCs reporting, the average number of members on the local ELC was 17, thereby representing a total

of 1,632 ELC representatives involved in the programming efforts of VCE. Sixty percent reported that they meet at least four times a year, indicating that consistent contact is occurring to achieve grassroots involvement. The survey results also indicated that committee structures were in place to involve ELC members in all three programs areas of VCE.

During this reporting cycle, training was conducted in each of the six districts involving 250 ELC members and faculty. Topics covered included ELC roles and responsibilities and situation analysis. All 108 local ELCs are currently conducting a situation analysis in their unit with completion scheduled for December 2004. The resulting comprehensive stakeholder input will be valuable in shaping the direction of Extension programming at the local level.

The VCELC met three times during this reporting period, with average attendance of members at approximately 35 members per meeting. The meetings provided a significant opportunity for volunteer members to communicate with VCE leadership concerning the issues/concerns and activities of the local ELCs, which they represent. In addition, planning district representatives provided communication to local ELCs concerning the work of the VCELC. The meetings also served as a significant forum for VCE's administrative and programming leadership to collect grassroots' input in the programming and administrative function of the organization. The VCE director and administrator met four times during this reporting period with the lay officers of the VCELC to ensure that meeting agendas reflected the collective view of the membership and to determine actions and decisions to be brought before the entire council.

Virginia State University Leadership Council

The Extension Leadership Council structure of Virginia Cooperative Extension provides an important formalized mechanism by which both Virginia State University (VSU) and Virginia Tech receive stakeholder input for Extension and research programs. The detailed structure and operational methods of VCE Leadership Councils are already described above. In addition, Virginia State University has established an Agricultural Research, Extension, and Teaching Leadership Council (ARETLC) to provide input regarding VSU's land-grant programs in the School of Agriculture. The Council is comprised of stakeholders who represent all three areas. Many of the persons serving on the council are recommended by various community groups and organizations. Input is provided by the members at the meetings and the input is used to strengthen programs and to make them more relevant for the clients.

Stakeholder input and participation are sought and encouraged at meetings with clients and community leaders, client surveys, listening sessions at community based meetings, producer meetings and meetings with commodity groups. Both formal and informal methods are used to seek stakeholder input. Once the input is received, it is considered and included in our programming process to extent possible. For instance at a recent ARETLC meeting, it was suggested that we expand our programs to reach more people and increase our effectiveness by employing part-time persons on a contractual basis rather than employing all full-time permanent employees. As a result of that recommendation, we have employed a two retired Extension agents to conduct educational programs in our Small Farm Technical Assistance Program and a faculty member with a Ph.D. to conduct programs in rural entrepreneurship and business development in selected high unemployment counties of the state.

College of Agriculture and Life Sciences Leadership Council

The college council membership was revised in 2003 to make it more effective and action oriented. The membership of the Council now consists of 25 members (rather than 80 persons as previously representing the key stakeholders with whom the College interacts). The purpose of the council is to establish open and regular communications between the college and Council members and to advance and promote College programs. The Council meets twice with at least one of the meetings being held in Blacksburg. Committees of the Council include the Executive Committee, Academic Committee, Development/Marketing Committee, and the Extension/Research Committee. The reconstituted Council met in January 2004.

Family and Consumer Sciences & Community Initiatives Extension Leadership Council

The Family and Community Sciences and Food, Nutrition and Health (FCS & FNH) Extension Leadership Council provides vision for the Virginia Cooperative Extension Family and Community Sciences and Food, Nutrition and Health programs and develops strategies that support the fulfillment of that vision. The FCS & FNH Extension Leadership Council assists in the identification of statewide problems, issues, and concerns; assesses current programs and helps to prioritize the application of program resources including funding; explores opportunities for cooperation and collaboration; and monitors and reports program outcomes to appropriate public and private partners.

The FCS & FNH Extension Leadership Council met three times this past year at Virginia Tech in Blacksburg, at Virginia State in Petersburg, and in Charlottesville. A major accomplishment was the revision of the by-laws including the categories of membership which has resulted in a broader representation of stakeholders including local government officials and representatives of key state and community partners. A major impetus to these changes was the reorganization of the Family and Consumer Sciences program to form two separate programs named Family and Community Sciences and Food, Nutrition and Health. This past year Extension Leadership Council meetings have focused on member education and discussion relating to the new organization and how we might best deliver programming at the local level in light of our reduction in resources and staff. The Leadership Council has formed subcommittees that are addressing funding to make possible the replacement of FCS and FNH on-campus and off-campus faculty lost through the recent state budget reductions and development of a marketing plan. Plans are underway for the sponsorship of a statewide conference in 2005.

4-H Leadership Council

The Virginia 4-H Leadership Council, consisting of 32 members, was created in 1994. Now in its 10th year of operation, it represents the diversity of the state's 4-H program and includes all major 4-H stakeholders. The members are recruited and selected to represent the six Extension Districts in the state, and each major group of stakeholders, including District Directors, Extension agents, volunteers, and at-large members. The members of this Council represent all locations of the state, as well as ethnic diversity.

During the reporting period, the Council met three different times, having to skip one meeting due to budget problems of the state and no travel funds. The Council is divided into three active working groups: Policy, Emerging Issues, and Marketing, and has been very active in all three areas. The Policy Committee reviewed major changes to Donated Animals to 4-H, including leased animals, 4-H Policies and established recommendations for changes, has provided further support for web-based 4-H curriculum. The Emerging Issues Committee addresses many issues identified by the Council; such as the loss of so many 4-H agents due to early retirement, the budget cuts imposed by the state, and working with restricted 4-H agents with no staff development funds available. It also provided further feedback on the Leadership Institute for 4-H teens at State 4-H Congress, 2004. The Marketing and Public Relations Committee developed a plan to promote 4-H throughout the state with Ms. Virginia (a former 4-H member); 4-H publications; 4-H signs; and publicity on both campus of Virginia Tech and Virginia State, National 4-H Week Events, and promotion of 4-H with PSA's. The committee further reviewed and recommended modifications to several promotional stories and pieces. The Marketing Committee is working very closely with the State 4-H Foundation with coordinated efforts in all aspects. The Council's activities continue to help shape educational programs that meet the needs of the youth of Virginia.

Local Government Reports

County and city governments differ as to how they prefer to receive reports on Extension programming efforts in the localities. Some local governments prefer written reports, which are reviewed by the elected governing board members. Others prefer that the agents attend board meetings on some periodic basis. When this occurs, the reports are presented in the public board meeting where the public is invited to attend and comment.

College of Liberal Arts and Human Sciences

Stakeholder input through advisory boards continues to be a major emphasis of the College of Liberal Arts and Human Sciences. In the past year university reorganization has resulted in changes in both the number and composition of departments making up the college. At present there are 16 advisory boards providing input and direction to the resident programs. Total citizen members exceed 200 and include individuals from a wide spectrum of backgrounds and areas of expertise. Each board met at least once in the past year, with most meeting two or more times.

College of Natural Resources Advisory Council

The College of Natural Resources maintains an active, external Advisory Council consisting of representatives of a wide variety of companies, state and federal agencies, non-governmental organizations, citizens and others central to the mission of the College. The Council has 60 members and met formally on campus once this year. During the two day meeting the council met in smaller committees, eg. forestry, fisheries, wildlife, forest products, and natural resources recreation. Other committee meetings, both formal and informal, have occurred throughout the year.

The Advisory Council provides the College administration and faculty advice and guidance in such areas as curriculum development and improvement (both undergraduate and graduate), research needs and quality of our research programs, and extension programs and impacts. The college provided an annual report to the Council at its annual meeting held in March. They reviewed the progress for the past year and made recommendations for next year.

Agriculture Industry Boards

Various commodity boards and other groups fund research projects annually on a competitive basis. This process provides valuable input to researchers about the focus of research efforts via the producer (stakeholder) input. The boards are "self-help" groups created by state law within the Virginia Department of Agriculture and Consumer Services for the purpose of promoting research, education and marketing efforts. The boards use funds generated through assessments that growers and producers of these commodities have agreed by referendum to pay for programs and projects that would benefit their commodities. Two board programs are funded either by licensing fees or a portion of revenue collected in taxes. Members of most of the boards are appointed by the Governor from recommendations made by the various industry groups. Research projects funded by the Virginia commodity boards are as follows:

Virginia Commodity Boards	No. of Projects	Funds Awarded in 2003
Corn	8	$ 61,750
Horse	1	$ 9,840
Peanut	7	$ 116,695
Small Grains	7	$ 63,200
Soybean	6	$ 49,303
Cotton	3	$ 20,781
Beef	1	$ 13,500
Bright Flue-Cured Tobacco	5	$ 36,500
Dark-Fired Tobacco	3	$ 9,000
Pork	3	$ 12,500
Winegrowers Advisory	11	$ 185,092
Egg Commission	1	$ 7,315
Sweet Potato	3	$ 6,932
Irish Potato	4	$ 17,996

The Sheep Industry Board, the Small Grains Association and the Apple Research Program did not fund research projects in 2003.

Additionally, the Virginia Agricultural Council was established by the General Assembly to provide a mechanism for financing agricultural research, education and services. Funding comes from assessment levied on certain agricultural supplies used by farmers. The Governor appoints 18 members of the Council who represent a wide range of farm commodities. Research and

extension personnel applying for these funds, likewise, are provided valuable stakeholder input during the competitive awards process. The Virginia Agricultural Council funded 20 projects at Virginia Tech in 2003 totaling $213,196.

D. Program Review Process

No significant changes have been made in the program review process.

E. Evaluation of the Success of Multi and Joint Activities

In 2003, input was gathered on Multistate Extension Activities, Integrated Activities (Hatch Act Funds), and Integrated Activities (Smith-Lever Act Funds) from research and Extension faculty through a questionnaire they completed on their projects and programs.

Many issues addressed through multistate Extension and integrated activities continue to be driven by input from various stakeholder groups. In most cases, projects and programs regularly include some combination of research, Extension, industry, and government agency input and active involvement through regular meetings and groups/boards. Many of these are collaborative in nature, rather than just advisory. Faculty stated that this input is very important in identifying high priority issues and in shaping research and Extension educational responses.

Some faculty indicated that their efforts to include input from a broad representation of stakeholder groups enhanced their ability to be inclusive of underrepresented and underserved populations and their needs. However, in other cases, faculty were at a loss to identify underrepresented and underserved audiences for their subject matter areas. In most cases, faculty were sensitive to this issue and indicated that their process for developing their project and programs was open to incorporating input and needs from underrepresented and underserved populations. In addition, many of the faculty indicated that their projects and programs were developed to address all levels and types of audiences, which would include underrepresented and underserved audiences.

The extent to which projects and programs described expected outcomes and impacts and resulted in improved effectiveness and/or efficiency varied by the nature and maturity of the effort. In some cases, goals and objectives, which included outcomes and impacts were identified by the stakeholder groups involved in the process. These were monitored throughout the lifecycle of the project or program, typically through annual project and program reviews. Project outcomes and impacts were typically documented in annual and periodic reports, journal articles, and publications written on the project or program, which we acknowledge are really outputs. And in many cases, anticipated outcomes are reported. Consequently documented outcomes are not evident in many of the reports. We are truly concerned by this and are developing a new VCE planning and reporting system that should address this issue in the future.

Summary reports provided below are selected ones that illustrate the best we have to offer at this point to show multistate and integrated activities and accomplishments from the 75+ faculty members reporting their work. We acknowledge and agree with the constructive comments from our reviewers on past reports and hope that, at the least, these show commitment to the spirit of this federal requirement. We will continue to strive and work towards a system that better documents the outcomes of multistate and integrated activities.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution Virginia Polytechnic Institute and State University
State Virginia

Check one: _X_ **Multistate Extension Activities**
____ **Integrated Activities (Hatch Act Funds)**
____ **Integrated Activities (Smith-Lever Act Funds)**

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
1. To achieve an agricultural production system that is highly competitive in the global economy.	**$296,000**	**$330,000**	**$450,000**	**$500,000**	
2. To provide a safe and secure food and fiber system.	**14,000**	**26,000**	**85,000**	**12,000**	
3. To achieve a healthier, more well-nourished population.	**14,000**		**5,000**	**5,000**	
4. To achieve greater harmony (balance) between agriculture (production activities) and (stewardship and protection of) environment.	**149,000**	**155,000**	**144,000**	**115,000**	
5. To enhance economic opportunities and the quality of life among families and communities.	**9,000**	**10,000**	**15,000**	**67,000**	
Total	**$482,000**	**$521,000**	**$699,000**	**$699,000**	

Judith H. Jones **3/1/04**
Interim Director **Date**

Form CSREES-REPT (2/00)
Note that the approved target of 10% was attained.

Brief Summaries of Multistate Extension Activities

Goal 1: To achieve an agricultural production system that is highly competitive in the global economy

Good Agricultural Practices Training
Other states involved: NY, NC, CA
The Good Agricultural Practices program is described as "on-farm food safety." Several outbreaks of foodborne disease in recent years have highlighted the need for better prevention and control of product contamination in the farm environment. Therefore, this program targets fruit and vegetable producers whose products are intended to be consumed fresh. Buyers of fresh fruits and vegetables are increasingly naming GAPs certification as a requirement for business. Farmers who are not trained or certified in GAPs run the risk of being less competitive in the marketplace. The GAPs program teaches proper on-farm practices from issues regarding manure use to proper cooling of harvested product. GAPs training is a prerequisite to certification. Without GAPs certification, producers may be at an economic disadvantage in the marketplace. Due to the wide-spread nature of fruit and vegetable production, GAPs training reaches a diverse audience. GAPs program results are difficult to assess due to dynamics in the marketplace and the recent buyer-driven push for certification requirements. However, it is believed by the trainers that the impact of this program will be seen in the numbers of trained farmers who ultimately receive GAPs-Certified status.

Rootstock and Interstem Effects on Pome- and Stone-Fruit Trees
Other states involved: IL, IN, IA, MI, MN, MO, OH, SD, WI, AR, CA, CO, GA, KY, MA, MD, ME, NC, NJ, NY, OR, PA, SC, TN, UT, VA, VT, WA, Canada, and Mexico
Tree fruit rootstocks are evaluated at many locations, following a common protocol developed by planting coordinators, to determine the adaptability of various rootstocks to different areas in North America. These are 10-year trials and results are periodically presented to international audiences at the International Dwarf Fruit Tree Association's annual meeting. Data are shared with other researchers by publishing results in refereed journals. Information is disseminated to North American stakeholders by publishing data in national trade journals. Results are disseminated to stakeholders within the state by presenting results at multi-county orchard meetings, the Virginia State Horticultural Association annual meeting, Winter Fruit Schools, newsletters articles, and Extension bulletins. Commercial fruit growers may also observe the trees at open houses at the Kentland Farm. Commercial fruit growers across North America have identified the lack of disease-resistant and stress-tolerant dwarfing rootstocks as the factor that is most limiting to high-density orchards. In Virginia, 10 to 20% tree mortality sometimes occurs within six years of establishing high-density orchards and this is due to disease problems. Information obtained from this project will benefit everyone who wants to grow fruit trees. Annual summaries, refereed journal articles, and trade journal articles resulting from this project are available on the NC-140 web site: http://www.nc140.org/. In 2003, an article was published in Virginia Fruit, the bi-monthly newsletter of the Virginia State Horticultural Association, describing 20 years of research with dwarf apple rootstocks in Virginia.

Commercial Vegetable Production Recommendations
Other states involved: DE, MD, PA, NJ
This multi-state project develops and updates information, and prints a shared commercial vegetable production guide that is distributed as an Extension publication to growers in each state. Each state has its own state cover design. In Virginia it is: Publication #456-420. Six staff from Virginia Tech participate in this collaborative effort. It addresses the key issues of concern to commercial growers: production techniques, varieties and pest control (insects, diseases and weeds). Chemical and variety recommendations are updated annually to stay current. Prices for this publication are generally kept just above costs, making it an affordable and easy to access (through county Extension offices) publication. It is a key source of information for vegetable growers of all farm sizes, including low-income farmers served by our 1890s institution, Virginia State. Through this publication we seek to deliver the most up to date vegetable production information for growers. It is our goal in Virginia to get this publication into the hands of those who will use and need it, and to keep the price reasonable. For many Extension meetings, it is included in the price of the registration fee. Our goal is to distribute ~300-400 copies on an annual basis at a price of $10.00 each. Complementary copies are given to each Extension office in the state, as well as to Virginia Tech faculty/agents working directly with vegetable growers.

Mid-Atlantic Beef Quality Assurance Program
Other states involved: PA, MD, WV, NY, NJ, MA
The Mid-Atlantic Beef Quality Assurance (BQA) Program is a beef producer education and certification program designed to improve beef quality and safety for the consumer. Beef producers complete an in-depth four hour training on BQA including lecture, manual, and hands-on formats. Subjects include proper use, handling, and administration of animal health products; proper animal care and handling; impact of adoption of BQA guidelines on demand for beef; importance of non-fed beef; effect of genetics on beef quality; and proper record keeping. Producers receive BQA certification and a BQA certification number after passing a brief exam and signing a producer agreement. This program addresses the critical issues of improving food safety and quality for consumers as well as creating value-added, source-verified beef cattle. Under-served and under-represented beef producers need and benefit from the Mid-Atlantic BQA program just as other beef producers do. The BQA trainings have been conducted in over 25 locations across Virginia and numerous locations in cooperating states. This allows greater access to BQA by under-served and under-represented clientele. Impacts are currently monitored by the number of producers that become BQA certified. Expected outcomes will be monitored through activity in value added marketing programs as well as the demand for calves from BQA certified farms. As of June 2003, over 1,200 beef producers in Virginia have been BQA certified. Although the program is only in its second year in Virginia, the program appears to be increasing the number of cattle marketed through the Virginia Quality Assured Certified Feeder Cattle program, a value-added marketing program.

Pest Management Guide for Field Crops
Other states involved: MD, DE, NJ, WV, PA
This project is a collaborative effort to bring the results of the applied research programs at the aforementioned institutions together as reflected in annual revisions to the Extension weed control recommendations for field crops. Pest control and associated crop profitability are critical issues for our stakeholders. This project addresses the needs of all field crop growers

where they require comprehensive and current weed control information. The annual publication of the Pest Management Guide under the combined authorship of one or more individuals from each of the states mentioned above documents this activity.

Grape Production Training Program
Other states involved: MD, PA
Extension specialists in Virginia, Maryland, and Pennsylvania conducted three, one-day shortcourses in the represented states. These shortcourses are full-day programs that cover fundamental aspects of commercial grape production, including site selection, varieties, economics, and basic steps in vineyard establishment and operation. The team approach highlights an interstate effort to regionalize Extension programs. Three workshops were presented in this reporting period, as follows:

Commercial "Beginners" grape growing seminar dates, locations and attendance

Date	Location	Attendees
11 October 2002	AHS AREC; Winchester, VA	53
6 February 2003	Howard County Fairgrounds, MD	50
10 June 2003	Lancaster, PA	Approximately 100

The program targets the sustained interest of beginning grape growers who seek information on vineyard establishment and operations. Specifically, the program addresses needs of new and interested producers who are entering the expanding grape and wine industry of the mid-Atlantic US. The program is moved among the three states to make it as physically accessible as possible. The programs are advertised in a variety of Extension media, including hardcopy and electronic newsletters and listserv-distributed communications. These basic or core shortcourses have been offered over 15 years and the goals have remained more or less constant over that period. The goals are to provide the basic information that new and aspiring grape producers seek, as judged by the nature of questions these clientele ask. Impact surveys were not used during this reporting period.

Integrated Pest Management for Field Crops (Alfalfa, Corn, Soybeans, and Small Grains)
Other states involved: MD, DE
This project focuses on coordination of pest management recommendations for field crops between Virginia, Maryland and Delaware. The Extension plant pathologists from the three states work together to develop plant disease and nematode control recommendations for the three states. A Pest Management Guide for Field Crops, Virginia Cooperative Extension Publication 456-016 (up-dated annually) and distributed in Virginia is co-authored by all four Extension plant pathologists. Pest Management Guide for Field Crops, Maryland Cooperative Extension Publication EB-237 (up-dated annually) and distributed in Maryland and Delaware is also co-authored by all four Extension plant pathologists from the three states. The program provides integrated control recommendations for field crop diseases. The strategies presented employ cultivar resistance evaluations, cultural control measures (crop rotations, timing of planting, etc.), fungicide economic treatment thresholds for small grains, seed treatments (biological, as well as, chemical). This collaboration provides field tested recommendations by the four plant pathology specialists for use in the mid-Atlantic and Chesapeake Bay production

region. This activity strongly supports the use of Integrated Pest Management and reduced pesticide usage. The program provides impartial disease control recommendations to all the citizens in the three states.

Southeast Greenhouse Conference and Trade Show
Other states involved: NC, SC, GA, FL, AL, TN
This is a three-day educational program and commercial trade show for greenhouse operators. The educational program is developed in conjunction with a Board of Directors composed of commercial growers. The program is always designed to address the most high priority areas of concern to commercial growers. The program is very affordable and the educational programs address needs of beginning or small operations as well as those of larger operations. All portions of the program are evaluated by participants. These results are used to develop future programs. However, we do not assess behavioral changes or integration of new techniques taught in the program.

Pasture-Based Livestock Production
Other state involved: CT, DE, DC, MD, ME, MA, NH, NY, PA, RI, VT, WV
NRAES is the Natural Resource, Agriculture, and Engineering Service (formerly known as the Northeast Regional Agricultural Engineering Service). NRAES will be publishing a book on pasture-based livestock production, which should be an invaluable resource for producers. This project involves a total of 60 authors -- 51 from 14 universities in the United States and Canada and nine non-university authors from five states and Canada. The project coordinator is from West Virginia University. The manuscript is 1,350 pages long and includes 30 chapters. The peer review is complete, and the authors are preparing a final manuscript. Separate peer reviews were conducted for each of the chapters. The peer review included 74 faculty and staff from 25 different colleges and universities. An additional 37 non-university reviewers are from 13 states and Canada. (Note: Approximately 85% of the reviewers returned comments.) NRAES anticipates a final manuscript in fall 2003.

Regional Peanut Marketing Risk Management Education
Other states involved: NC, GA
The Peanut Marketing Regional Project is funded through CSREES/Southeast Risk Management Center. Objectives are to deliver regional train-the-trainer workshops to business participants and influencers of the peanut industry. We recently conducted workshops in Roanoke Rapids, NC, and Tifton, GA. We are in the process of developing information bulletin CDs for distribution to the participants and other interested parties. The project addresses the economic impacts of dramatic changes in the peanut industry resulting from the 2002 Farm Bill. The participant/stakeholders in these workshops are the front line in helping farmers cope with these changes and adapt their business operations. The project has a comprehensive scope, covering providers of all major agricultural services to the peanut industry. The outcomes and impacts have not yet been documented since the project is not finished. Results are expected by June 1, 2004.

Goal 2: To provide a safe and secure food and fiber system

Fresh Produce Food Safety Training Program for the Southeast (GAPs: Good Agricultural Practices)

Other states involved: NC, FL, SC, OK, GA, LA

Good Agricultural Practices (GAPs) is a grower educational program being developed nationwide through funding by the USDA-CSREES National Food Safety Initiative. It utilizes a practical, common sense training approach to implement on-farm safety measures for safe fresh produce (vegetables and fruit) production. A HACCP-like (Hazard Analysis Critical Control Points) approach is taken to evaluate potential problem areas in pre-plant, planting, production, harvest, packing, storage, and transportation phases of fresh produce by commercial grower/packers. The program is also relevant for direct market and pick-your-own operations. The primary focus is on prevention of problems as related to microbial contamination through human and animal introduction/contact, and emphasis on good documentation and record keeping practices. Currently, our commercial producers are facing pressure through contractual requirements of some produce buyers to provide evidence and documentation of their efforts to implement food safety measures on the farm. A key component of this documentation is attendance of GAPs educational sessions by the grower. Hispanic workers are a key target audience for the GAPs program. These training materials address issues important to their livelihood, as well as safety of their own families. They are the people group with the most intimate contact with farm-grown fresh produce, being involved in the harvest and packing of these commodities. Since most produced is marketed unwashed, workers are often the last to touch the produce before the consumer. This program seeks to bring education to these workers via on-site presentations, videos, and posters placed in the work areas. In addition, many Virginia grower/packers are small farmers, and this training gives them, and other small growers that direct market, an important marketing tool that promotes the safety of their produce. It also gives them the educational tools they need to implement on-farm safety measures, and lessen the liability of the farming operation. Project objectives are to reach 100% of Virginia's grower/packer/shipping operations with the GAPs program. Documentation of impact will be seen in the numbers of growers who attend these meetings and ultimately begin implementation of a farm plan addressing food safety. As a result of attention to the GAPs issue, a state-wide on-farm GAPs certification program began in Virginia in 2003. It is coordinated by the Virginia Department of Agriculture and Consumer Services (VDACS). The value of this certification will be immediate in situations where produce buyers require these third party farm inspections. Our state is poised to do this as a service to growers at a reasonable hourly fee. Definitive impact of our program will be noted in the number of successful certifications in the state in coming years.

In 2002 and 2003 an emerging issue took precedence with our GAPs training effort. Recent requirements by some produce buyers and brokers for third-party inspections of grower's farms was noted in spring 2002, and a number of growers (SW Virginia) lost buyer contracts due to a lack of training and certification in Virginia. In response, Good Agricultural Practices (GAPs) training was offered during the winter of 2003 as an expanded GAPs workshop. These trainings built upon previous introductory training and the emphasis was on preparation for on-farm inspections. The workshop was offered in five locations statewide and was attended by approximately 115 commercial shippers. The four-hour "Advanced GAPs Workshop" was

conducted in the Richmond, Northern Neck, Tidewater, Hillsville, and Scott County areas of Virginia as a collaborative effort of Virginia Tech specialists in Horticulture and Food Science, and officials from the Virginia Department of Agriculture (VDACS). At Richmond, the sessions were conducted in conjunction with the Virginia Grown Conference. For three days of this conference, a GAPs poster display was set-up as a location for the 200 attendees to view and receive GAPs information and literature. The "Advanced GAPs Workshop" program focused on microbiology aspects of food safety, detailed pre- and post-harvest GAPs procedures, traceback, record keeping, and an introduction to a new statewide farm certification program offered by VDACS. A number of GAPs publications were distributed at these meetings. Measurable impacts of these efforts will be determined by the number of farms acquiring certification in response to buyer demands in coming years. Qualitative and safety improvements of Virginia-grown fresh produce have been better assured as a result of this program. In June 2003, two Food Safety specialists attended a national GAPs coordinators meeting, held in Phoenix, AZ, and hosted by Cornell University. During June and July 2003, on-farm GAPs training for Hispanic workers was delivered to migrant workers in the Northern Neck region of Virginia. The program was delivered in Spanish in four different sessions to 75 workers.

Summary Statistics 02-03:
- 115 commercial scale growers received four-hour block training in advanced GAPs principles and farm plan development training
- 75 migrant workers trained in GAPs principles in Spanish
- 5 in-depth workshops were conducted across Virginia in early 2003
- 500 GAPs brochures in English were distributed
- 200 GAPs brochures in Spanish were distributed
- 350 "Food Safety Begins on Farm" booklets distributed
- 300 "Developing a Plan" brochures (developed by VDACS) were distributed at sessions
- 300 "Good Agricultural Practices for Fresh Fruits and Vegetables" (USDA/VDACS publication) distributed at training sessions.
-150 "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables (USDA)" were distributed at training sessions
- 125 "Crop Specific Brochures" (NC Bulletins) for each of 7 vegetable, and 1 small fruit topics were distributed to local extension offices around the state.
- The "UC GAPs Primer" CD was distributed to 15 VCE agents for training purposes
- Two Food Safety Specialists from VA Tech attended the National GAPs Collaborators Meeting at Phoenix, Arizona in June 2003.

Fisheries Extension Enhancement: Training and Education in Support of Control for Scombroid (Histamine) Poisoning
Other states involved: MD, RI, NY, DE, NC, GA, OR
Scombroid fish poisoning is associated primarily with consumption of tuna, mahi-mahi, and bluefish. From 1988-1997, scombroid fish poisoning was reported in 145 outbreaks involving 811 persons from more than 20 states. The toxin can form from fish handling practices on fishing vessels and anywhere along the distribution chain after the fish is caught until it is severed at a restaurant or at home. After the training materials are developed, they will be evaluated by vessel operators and processors selected for their diversity of operations and other cooperators. Modifications will be made as necessary before publication. Training programs

will be conducted, and follow-ups with program participants will include interviews and a survey to determine the extent that recommended control procedures are implemented and any problems or improvements identified by industry. Investment and operational costs will also be requested. Sea Grant personnel and partners will evaluate the effectiveness of the controls by direct observation and by monitoring ambient fish temperatures on commercial fishing vessels and/or charter boats. This is a key critical issue for commercial fishing vessel owners and operators. The Food and Drug Administration (FDA) requires that vessel operators keep time/temperature cooling and storage records for scombrotoxic fish species. This is not currently being done on a wide basis, and histamine poisoning is one of the three leading causes of seafood illnesses in the U.S. according to the Centers for Disease Control (CDC). This program addresses the needs of fishing boat owners and operators. Previously, most of the HACCP related training and Extension efforts have focused on processing plant operations and not harvest vessel personnel. Products will include: 1) two or more histamine models with forms for maintaining records on vessels as required by processors and regulators; 2) a trainer's guide; 3) a web site containing updated resource information and downloadable models, forms, and brochures; 4) a video tape demonstrating strategies for histamine control; 5) two informational brochures; 6) one or more waterproof task sheets for use on vessels; and 7) customized publications developed in each state for local audiences.

Development of Dairy and Animal Production Food Safety InfoBases
Other states involved: National
Brief description: Initially, this program was to compile as many references related to on-farm milk safety and quality as could be found over the web and incorporate them into version 4 of the national dairy database, called Dairy InfoBase. Specialists in dairy production, dairy products, and veterinary medicine from many states are part of the milk safety and quality domain. The Dairy InfoBase is available in CD-ROM and the web through the ADDS Center (Agricultural Databases for Decision Support). Subsequently, funding was obtained from USDA FSIS to create a set of teaching and training modules (curricula materials) suitable for electronic delivery addressing the priority areas of on-farm food safety in all animal commodities. The modules are intended for a diverse audience including Cooperative Extension System field staff and specialists, other educators, consultants, veterinarians, service personnel, and producers of food animal products and will be disseminated through the ADDS Center. The materials include a supporting food safety knowledge base and provide selected and appropriate educational materials that have been developed in recent years through federally and state funded projects and programs. A steering committee consisting of Extension specialists in various animal commodities, food science, and veterinarian medicine from throughout the U.S. was formed to establish criteria for the modules.

Dairy HACCP
Other states involved: NC
The Hazard Analysis Critical Control Point (HACCP) program for dairy processors is a voluntary food safety program that results in improved safety of dairy products. Currently, Virginia Tech and North Carolina State University hold joint training workshops for dairy processors in both states. Ten dairy processors, 85 people, have received HACCP training. These individuals have developed HACCP plans for their dairies. The ten dairies will be inspected against their HACCP programs by state food regulators.

Goal 3: To achieve a healthier, more well-nourished population

International Food Safety Icons for the Retail Food Industry
Other states involved: FL, NY, MD, IL
The purpose of this project was to develop "International Food Safety Icons," which are pictorial representations of important retail food safety tasks that can be recognized regardless of a person's native language. The project was a collaborative effort between representatives of regulatory agencies, the foodservice industry, and academia under the auspices of the International Association for Food Protection. A similar project is underway to develop food safety icons for food processing industries. Retail food workers, who may or may not read English, will be able to understand and comply with these messages to ensure safe food handling and preparation. A significant percentage of foodservice and food retail workers do not sufficiently speak or read English. Food handlers of all nationalities and English speaking abilities will be able to understand and comply with these messages to ensure safe food storage and preparation. The graphics are eye-catching and communicate the meaning of the words to someone who cannot read or does not take the time to read the educational component. The International Food Safety Icons have been widely advertised and distributed in printed materials and over the internet. Many companies and organizations are adopting and some or all of the icons for use on product labels, food preparation instructions or training materials.

Goal 4: To achieve greater harmony between agriculture and the environment

Water Quality and Waste Management
Other states involved: AR, CA, CO, FL, HI, IN, IA, KS, MI, OK, OR, PA, TX, WA, WY
The W-170 Multistate Workgroup conducts research and develops and conducts Extension programs designed to investigate and provide education, respectively, on the Chemistry and Bioavailability of Waste Constituents in Soils. The purpose of the project is to answer questions regarding the environmental effects of land applying wastes, especially biosolids, whose use has been identified as a high concern by local governments and citizens. The project is designed to answer questions regarding the health and safety concerns of land-applied biosolids and other waste residuals, whose use is often cited as a threat to under-served and under-represented audiences. The annual multistate report incorporates objectives, studies performed, a summary of results, the usefulness of the findings, work planned for the following year, and publications issued or manuscripts approved. During the reporting year, it was determined that: 1) the application of biosolids at higher than nitrogen rates needed for plant growth increased the rate of disturbed soil restoration with acceptable amounts of nitrate leaching, 2) the application to a Piedmont soil of biosolids-borne heavy metals at concentrations within regulatory limits are safe to soil, water, and crops, and 3) land application of composted wastes improves soil properties and crop productivity without polluting the environment. These results have been incorporated into Extension agent training and shared with Virginia regulatory agencies in the development of environmentally sound and economically viable regulations for biosolids and compost use.

Southern region Pesticide Safety Education Center
Other states involved: AL, AK, FL, GA, KY, LA, MA, NC, OK, SC, TN, TX
The Southern Region Pesticide Safety Education Center was developed by the Southern States to enhance pesticide safety education programs throughout the region by offering educational

programs to pesticide safety educators in the region. The audience includes Extension agents, specialists, and both state and federal regulatory personnel. The Center is physically housed at North Carolina State University. NCSU sponsors two courses in Raleigh annually. These three-day workshops are preceded by an on-line instructional component developed by Virginia Tech. Enrollees participate in the on-line course prior to and as a condition to attending the workshop. The project addresses the need to provide the public with qualified trainers for teaching pesticide safety education to applicators in the southern states. The Center serves the needs of those states with inadequate resources to train their trainers in pesticide safety education. It also allows states to avoid duplication of resources and share resources. Outcomes are to train trainers from Extension and regulatory agencies in the Southeast. Thus far, two workshops have been conducted with 80 participants. This has fulfilled expectations to train two groups in the first year of the Center's existence. This effort will continue in 2002 to provide two additional courses. Every state in the Southeast Extension region has participated in some way. The Western region of states is using the concept and studying the Center in order to establish a similar center there. There is also interest from the Northeast states. Participation is welcome, but limited to those resources provided by the grant funds provided by the North Carolina Pesticide Control Board. If additional funds were provided, this Center could expand to offer programs to other groups. We are currently advising other states, as mentioned above. A stable funding source is critical and contributions by participating states (both in-kind and monetary) would help to establish the Center.

National Recordkeeping CD-ROM for Farmers

Other states involved: All states

The National Recordkeeping CD-ROM for Farmers project was initiated in 2001 with a grant from the USDA/Agricultural Marketing Service/Pesticide Recordkeeping Branch. The two-year project involved working with stakeholders (farmers, pesticide regulators, USDA staff, and University faculty) from multiple states. The CD was delivered to USDA in Dec. 2003. The CD will be distributed nationwide and 1500 CD's were created for incorporation into Virginia's pesticide safety education program and to provide to cooperators. The CD, which was completed on December 31, 2003, provides an educational program for farmers with PC or Mac computers. It includes information, exercises and forms to assist the grower in complying with the Federal Pesticide Recordkeeping Requirements. The CD is 508 compliant and was developed to assist growers with the means to run the CD. It is part of a number of outreach media currently provided to the states by USDA. It complements and enhances those media to provide another means to assist stakeholders. The CD is especially helpful to those individuals who are visual learners and may have trouble assimilating information in a paper format. The CD is a final product delivered for this two-year project. It was tested with stakeholders several times prior to completion. The outcome of those tests provided refinements to make the CD more user-friendly and the content easier to learn. The CD is just now being implemented in its final form in education programs nationally. The outcome of that activity will be monitored over the next few years. In addition, the USDA has funded a new project to use the CD content and to develop other training media for use with a distance education course for pesticide regulatory inspectors across the US. There will be over 500 inspectors enrolled in the course, which will be developed by Virginia Tech over 2004 and delivered to the audience the fall-winter of 2004/2005.

Southern Region Pest Management Center
Other states involved: AL, AK, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX
The Southern Region Pest Management Center was developed by the Southern States to enhance pest management programs throughout the region. The Center offers a source of competitive grants to develop pest management information programs in the Southern States. It is also the focus of pest management programs and is one of four USDA funded regional pest management centers. The Center is physically housed at the University of Florida in Gainesville. Member states are developing crop profiles and regional and state pest management strategic plans. These documents are developed with stakeholder input to establish the pest management needs for various crops affected by the Food Quality Protection Act. The profiles and the plans are used by USDA and EPA to assess the continued registration of pesticides in the United States. It is critical to agriculture and specialty crops to have input into this process through these documents in order to protect their commodities and businesses from the possible loss of adequate and viable pest control tools. The project is built around stakeholder input. Nothing is done with the crop profiles and strategic plans unless stakeholders are involved in their development. The potential outcome of this project provides support to large and small farmers and specialty pest control areas. It allows the whole industry to have input where input was not available before. It also protects the food and fiber sources of the American population. The expected outcomes are clear and the potential impacts are definite. The project provides stakeholders a conduit to be involved in the decision-making process associated with the FQPA. The stakeholder committees established in this process result in documents established under the contract with the Center and USDA. They must meet established criteria. The impacts if done properly will meet expected outcomes as stated. Every state in the US is involved in a similar process through other Centers. The Southern region Center involves both 1862 and 1890 participants. Other groups would be welcome, including commodity and pest management organizations.

Powell River Project
Other states involved: WV, KY
The project focuses on faculty who conduct research to address mine-reclamation and coal-mine environmental protection practices and who work with regulatory agencies and industry to implement research results as improved reclamation and environmental protection practices. The Powell River Project operates with a Board of Directors that represents the coal industry and other mining-region community interests. The Board helps establish research and education priorities. Expected impacts are improved reclamation and environmental protection practices, and a regulatory climate that accommodates changing practices that are based on scientific research. Changes have been documented by companies involved in the project. For example, two such firms are currently putting in mine reforestation field trials based on Powell River Project (PRP) research. A number of firms are using PRP mine vegetation and coal refuse reclamation guidelines. Linkage of research with extension, allows communication of industry research needs to researchers, and communication of research results to industry through extension.

Goal 5: To enhance economic opportunities and the quality of life among families and communities

National 4-H Camping Research Consortium
Other states involved: WV, GA, FL, NJ
The purpose of the National 4-H Camping Research Consortium (NCRC) is to coordinate the resources of multiple state 4-H programs in order to effectively evaluate the outcomes of 4-H camping on a national level. Because this task requires a coordinated effort that would be beyond the capabilities of individual states, a *consortium* approach is warranted. Although many states conduct regular evaluation of 4-H camping each summer, systematic evaluation across multiple states is rare. As the American Camping Association noted, "despite years of anecdotal evidence, no formal research has been conducted on a national scale to identify exactly what outcomes campers experience, and which inputs and activities are most effective in helping campers succeed" (ACA, 2003). Additional information is needed about the outcomes of 4-H youth development that is provided in a camp setting. As 4-H camping emphasizes positive youth development, 4-H camping may differ from the outcomes targeted by camping provided by other youth service organizations such as parks and recreation, churches, etc. Unfortunately, multi-state partnerships in 4-H camp evaluation have not been developed, and the methods and instruments for such an assessment are not available. Expected outcomes include: 1) development of a group of Extension camping professionals who agree to work cooperatively to explore the outcomes of 4-H camping on a national level, 2) development of an evaluation process to assess the outcomes of 4-H camping on a national level, 3) creation (or adoption) of assessment instruments for 4-H camping on a national level, 4) at least one (1) research publication in a nationally recognized and peer reviewed journal regarding the outcomes of 4-H camping on a national level, 5) at least one (1) presentation at a national conference regarding the outcomes of 4-H camping on a national level, 6) development of a partnership with the American Camping Association with regards to the national evaluation of camping outcomes, 7) development of a long-term plan for collaboration and continuance of the consortium. Multi-state outcome research from the National 4-H Camping Research Consortium is not yet available.

4-H International Programs
Other states involved: AK, AZ, CA, CO, GA, HI, ID, IL, IN, KS, KY, MA, ME, MI, MO, MT, NC, ND, NE, NJ, NY, OH, OR, PA, SD, TN, TX, UT, WA, WI, WY
4-H International Exchange Programs under the leadership of the 4-H International Exchange Committee include: month-long, inbound and outbound Japanese and year long inbound Japanese High school exchanges, month-long inbound programs with Korea and Mexico and the inbound, year-long FSA/FLEX high school program, which includes the Newly Independent States (NIS) of the former Soviet Union. Based on research conducted by the 4-H IPC, the 4-H International Exchange Program 1) helps young people and their families understand the importance of knowing about other countries and the US, and their respective cultures, 2) instills positive cross-culture attitudes and skills that enhance mutual understanding and acceptance of all people, 3) expands the opportunities for young people to experience global citizenship responsibilities in today's interdependent world, 4) increases self-esteem and confidence through adapting to new situations, 5) helps participants learn languages and communication skills, and 6) increases overall global awareness. Program participant data may not exist at the national

level for the 4-H International programs. This data is available on a state-by-state basis. However, state-level experience indicates that these programs attract families and members of different races and income levels. Very low income families tend not to participate due to some of the costs involved. Most significantly the program routinely attracts many previously non-4-H or Extension users. An evaluation study was commissioned by 4-H International Programs to evaluate the impact of the 4-H Japanese Exchange program on youth, both those who travel to Japan and those who serve as host siblings for Japanese or Korean youth visiting the United States. Specifically, the study focused on understanding the ways in which youth developed personal competence, important life skills, and inter-cultural understanding. Results indicated that youth traveling to Japan acquired new life skills, enhanced personal growth, and reported a significant change in comfort levels in relating to people from other cultures. The results of this evaluation clearly show the impact participating in the 4-H Japanese Exchange program has on youth. From learning to appreciate other people and cultures, to developing important social skills, to forming a self and career identity, youth participating in the exchange report that the experience had a high level of impact on their developing lives.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution Virginia Polytechnic Institute and State University
State Virginia

Check one: ____ **Multistate Extension Activities**
_X_ **Integrated Activities (Hatch Act Funds)**
____ **Integrated Activities (Smith-Lever Act Funds)**

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
1. To achieve an agricultural production system that is highly competitive in the global economy.	**$187,000**	**$206,000**	**$246,000**	**$250,000**	
2. To provide a safe and secure food and fiber system.	**40,000**	**45,000**	**50,000**	**40,000**	
3. To achieve a healthier, more well-nourished population.	**10,000**	**15,000**	**20,000**	**30,000**	
4. To achieve greater harmony (balance) between agriculture (production activities) and (stewardship and protection of) environment.	**30,000**	**45,000**	**50,000**	**45,000**	
5. To enhance economic opportunities and the quality of life among families and communities.	**34,000**	**50,000**	**55,000**	**56,000**	
Total	**$301,000**	**$361,000**	**$421,000**	**$421,000**	

Dean Sharron Quisenberry **3/1/04**
Director **Date**

Form CSREES-REPT (2/00)
Note that the approved target of 14% was attained.

Brief Summaries of Integrated Activities (Hatch Act Funds)

Goal 1: To achieve an agricultural production system that is highly competitive in the global economy

Developing Environmentally Sustainable and Economically Viable Cropping Systems
The production of corn, wheat, and soybean is economically and environmentally important in the mid-Atlantic United States. The efficiency of production systems must be increased to maintain economic viability but production systems must maintain and/or enhance soil quality. The purpose of this study is to enhance grain yields and farm profits while maintaining or improving soil quality. These data provide growers and advisors support for reducing tillage and increasing cropping intensity in agronomic crop production systems in the mid-Atlantic, not only for economic benefits but also for improving soil quality. The Climate Analysis Tool enables growers and advisors to make data-based decisions for crop planting dates and selection of the most appropriate maturity hybrids and cultivars on almost 2 million acres of crops in Virginia.

Development of New Potato Clones for Environmental and Economic Sustainability In The Northeast
To remain competitive, eastern potato growers need new cultivars that are resistant to insect and disease pests, are adapted to a wide range of growing conditions, and address new and existing marketing opportunities. This project examines regional adaptability of germplasm from various breeding programs, including susceptibility to internal heat necrosis. Germplasm evaluations provide information regarding adaptability of new cultivars and advanced selections to the growing conditions in eastern Virginia. Currently, growers rely primarily on one tablestock cultivar that is susceptible to early dying, and two chipping cultivars that are both susceptible to the physiological disorder internal heat necrosis (IHN). Identification of new cultivars adapted to this growing area will spread grower risk of economic loss which can be as high as 10-15 percent in years conducive to expression of IHN.

Development of Pest Management Strategies for Forage Alfalfa Persistence
Stresses such as unfavorable growing conditions, interference by weeds, and injury by pests significantly shorten alfalfa stand life. The goal of this project is to improve persistence of forage alfalfa stands by implementing ecologically-based pest management strategies. Growers in the mid-Atlantic states who plant insect resistant glandular-haired varieties may be able to eliminate up to two insecticide sprays saving as much as $37/ha. Current economic thresholds for alfalfa weevil and potato leafhopper may be too conservative for fields planted in the latest glandular-haired alfalfa varieties. The results of three years of field trials across two locations in Virginia do not support the claim that '54H69', a second-generation leafhopper resistant alfalfa variety, is any better at protecting yield loss from potato leafhopper infestation than 'Choice', the standard non-resistant alfalfa variety used in these trials.

Implementation of a Novel Biological Control Strategy for Plant-Parasitic Nematodes
Plant-parasitic nematodes devastate agriculture. Biological control is possible with a microbial insecticide, but this interaction is not well-understood. Our overall objective is to develop, implement and assess a new, biologically based management strategy for plant-parasitic nematodes and to assess the importance of interactions between this biological control strategy

and other human influences on soil biology. Plant-parasitic nematodes are devastating pests and the use of chemical materials with which they are managed is becoming more restricted. Our objective is to develop alternatives to traditional materials, either in conjunction with industry or otherwise. In addition to field testing, we will understand how to make existing materials more effective through a deeper understanding of their biology. This work will offer growers new materials with which to manage plant-parasitic nematodes that have been tested in the field for efficacy.

The Poultry Food System: A Farm to Table Model

Pale, soft, and exudative meat is a multi-million dollar problem in poultry industry with yield losses to producers and unacceptable meat quality characteristics to consumers. Antibiotic use in the poultry industry is under scrutiny by consumer health groups. This project aids in determining causative factors of poor quality meat and may provide solutions to processors to decrease the incidence of PSE meat. The purpose of this study is to increase overall bird health and productivity through non-antibiotic means. Food processors and regulatory authorities increasingly want to determine the presence of Listeria monocytogenes in the plant environment. When present, this organism is often at relatively low frequencies and concentrations in foods or plant environments. This project will provide valuable information for the selection and proper handling of environmental sample transport media prior to qualitative or quantitative analysis for Listeria monocytogenes. The results of this study will aid the development of sampling protocols that maximize the survival and recovery of Listeria monocytogenes. Processors will have greater assurance that their sampling plans can detect the presence or concentration of Listeria monocytogenes.

Optimum Dairy Breeding Programs for Profitability

Dairy producers face tightening economic pressure in their operations. Genetic changes have their impact five years in the future. This research is to provide a basis for developing optimum dairy cattle breeding programs for profitability for milk, fat, protein, mastitis resistance, longevity and conformation, and to deal with the negative impacts of inbreeding on reproductive and survival traits. This research has shown that limiting the period of opportunity considered to five years significantly reduces the estimated lifetime net income and only explains about 69 percent of the variation in lifetime net income of the same cow. Thus, indicating that it is important to give the cow's sufficient opportunity to express their differences in lifetime net income. The impact of using 305 days vs. complete lactation data was substantially smaller but still may be large enough to have a significant impact on the relationship between PTA of the sire and estimated lifetime net income.

Improving Systems for Management of Soybean and Peanut Arthropod Pests

Currently, many producers over use pesticides in their attempts to manage insect and mite pests on peanuts and soybeans. Better management programs could result in significant pesticide use reductions, with no loss of crop quality or yield. This project is designed to develop techniques for improving management of soybean leaf feeding insects and mite pests of peanut. A large effort was initiated to determine the level of pyrethroid resistance in local corn earworm populations. Corn earworm attacks many crops in Virginia, including sweet corn, soybean, cotton, peanut, tomato, and many other vegetables and ornamentals. Most growers apply one or more insecticides in the pyrethroid class to achieve control. Evidence is growing in southern

states that corn earworm is developing resistance to pyrethroids. As a result, growers are sustaining crop damage and are having to shift to more expensive control alternatives. In 2003, this project determined a resistance level baseline for Virginia. Both adult (3,602 individuals) and larval (579 individuals) corn earworms were collected over the 2003 growing season from throughout eastern Virginia and tested for pyrethroid resistance. Results were encouraging and showed that overall resistance was well below critical levels. A sustained resistance monitoring program is needed for development of resistance management strategies.

Enhancing Reproductive Efficiency in Swine Operations That Utilize Artificial Insemination

The use of artificial insemination by commercial swine producers is increasing but its efficacy is limited by, 1) boars that consistently display a reluctance or refusal to mount an artificial sow and/or ejaculate mediocre or poor quality semen, and 2) lack of effective methods for synchronizing estrus in replacement gilts. This project examines methods of optimizing sperm production and libido in boars used for artificial insemination and the development of novel strategies for synchronizing estrus in gilts. Prostaglandin products such as Lutalyse are often used on commercial swine farms in an effort to enhance libido in boars. The consequences of repeated injections of Lutalyse on semen characteristics have not been previously studied. Our results suggest that other than a slight reduction in semen volume, there are no negative effects of Lutalyse on indicators of semen quality. Thus, swine producers that use Lutalyse in attempts to enhance libido in boars can do so with the knowledge that semen quality will not be overtly compromised. When semen was collected from Lutalyse-treated boars once daily for four consecutive days, the interval between entering the collection room and the start of ejaculation decreased. Thus, Lutalyse has potential for enhancing libido in boars acutely exposed to an intensive semen collection regimen.

Variety and Quality Evaluation of Virginia-Type Peanuts

Data collected from all segments of the industry is needed before release decisions are made concerning advanced peanut breeding lines. Development of new peanut varieties without total industry input can lead to the release of varieties that are acceptable and advantageous only to a particular segment of the industry. This project evaluates, provides data, and recommends new peanut varieties for release that are acceptable by the total peanut industry including the grower, sheller, processor, and consumer. The viability of the peanut industry depends upon the development, evaluation, and release of new peanut varieties. Higher yielding, disease resistant varieties with desired milling characteristics and acceptable quality factors must continue to be released for the peanut industry to prosper. VA 98R, Perry, and Wilson are newly released varieties that are beneficial to all segments of the peanut industry (growers, shellers, and processors). They offer high yields, early maturity (VA 98R and Wilson), bright pod color for the inshell industry, and other grade and quality characteristics that are acceptable by the total peanut industry.

Management Systems for Improved Decision Making and Profitability of Dairy Herds

Management of heifers on the dairy farm has been under-researched relative to their cost of production. This cooperative research from several states is to determine the status of heifer enterprises in the U.S. and to develop recommendations to improve their nutrition, management and profitability. The replacement heifer enterprise in dairy businesses consumes about

$500/cow per year, 20 percent of production expenses, or $5/100 kg of milk sold. Herds that have implemented management procedures and feeding recommendations to reduce calf losses from 15 percent to 10 percent have saved $0.26/100 kg of milk, or $5,000/yr for a typical 200-cow dairy business. Researchers in this project founded the National Heifer Growers Association in 1996. It now has 400 members dedicated to the efficient rearing of quality dairy replacement heifers in the U.S.

Goal 2: To provide a safe and secure food and fiber system

Enhancing Food Safety Through Control Of Food-Borne Disease Agents
Certain agricultural practices contribute to the contamination of raw produce with food borne pathogens. Raw produce can receive antimicrobial treatments to reduce food borne pathogens. The purpose of the study is to develop a central evaluation method for the use of antimicrobial treatments on fresh produce. This project will validate the effectiveness of HACCP systems in food processing plant environments. Food safety of fresh produce and ready to eat meat products continues to be an area of investigation. Decontamination and growth control procedures such as the use of additional preservatives, wash treatments, and alternative processing technologies are needed. Wash treatments such as, hydrogen peroxide, acetic acid, and other organic acids have been shown to be effective to eliminate pathogens from the surface of fresh produce. Ultraviolet light energy is a lower cost processing technology that can be utilized by processors.

Destruction of Clostridium Botulinum in Foods at Minimal Processing Temperatures
New food products and processes that use minimal processing can be potentially hazardous due to Clostridium botulinum growth and toxin production. The purpose of this project is to determine the conditions for destruction of foodborne pathogens and prevention of their growth in foods that receive minimal processing. Foodborne illness can result from the consumption of ready-to-eat foods such as uncured cooked turkey breast that has been contaminated with pathogens such as Clostridium botulinum or Listeria monocytogenes. This study showed that both Clostridium botulinum and Listeria monocytogenes, if present in uncured cooked turkey breast, can grow under both temperature abuse and extended refrigeration conditions. The product may be hazardous ever though there is no off-odor associated with the turkey breast at time of consumption. Proper refrigeration and avoidance of extended storage time are important for product safety.

Prevention and Reduction in Microbial Pathogens During the Production, Processing and Preparation of Poultry
Production of edible poultry products during the continuum of farm rearing of birds through processing and preparation presents many opportunities for microorganisms to proliferate or contaminate raw products. This project seeks ways to prevent pathogenic bacteria from contaminating poultry products, to reduce the populations of microorganisms during processing, and examines sampling procedures to characterize a microbial population from live poultry. For reducing the incidence of Arcobacter butzleri on commercial poultry, improved protocols are needed to sample and identify this bacterial pathogen from infected chickens prior to slaughter. This study demonstrated the relative effectiveness of microbiological sampling methods that may be used to detect A. butzleri from chickens or their environment. Poultry growers and

researchers can now optimize their sampling methods and sampling plans to aid their ability to detect and control this pathogen. Exposure to ultraviolet radiation at the tested intensities and times of exposure would not significantly benefit the keeping quality or the shelf life of split, boneless, skinless chicken breasts. While the UV treatments had a minimal impact on the taste of cooked chicken breast, these treatments would not be an effective way to reduce bacterial numbers on raw chicken.

Goal 3: To achieve a healthier, more well-nourished population

Food Demand, Nutrition, and Consumer Behavior

There is considerable debate regarding whether consumer tastes and preferences for meat, particularly beef, have shifted, and if so, whether this change is related to consumer demographics or increased concern over diet-health relationships. The purpose of this project is to help resolve the current debate regarding factors influencing the demand for meats by re-examining and extending existing models. Our research results show that prices and income alone cannot explain consumer meat choices. Concerns for health and the perceived healthfulness of the various products significantly affected buying patterns. We were able to quantify the extent to which consumers' over-or under-estimate the fat content of various meat products and identify significant differences in fat perceptions based on household type and location. Our results suggest that general education efforts regarding the healthfulness of meats could greatly improve consumer diet choices. Nutrition educators and/or the various meat industry groups will find our results useful in focusing educational programs aimed at improving consumers knowledge regarding the healthfulness of these products.

Estimation of Processed Food Produce Demand Elasticities for Policy Analysis

Economic analyses of issues relating to firm or industry competitiveness, and the assessment of the impacts of public policy upon the performance of the food system depend critically upon the existence of reliable, relatively recent, and disaggregate elasticity of demand estimates. The purpose of this project it to estimate a complete system of own-price, cross-price, and income demand elasticities at the retail level for major grocery product categories and to use the estimated demand elasticities to determine the robustness of previous research on industry competitiveness. Having reliable and disaggregate elasticity of demand estimates for processed food products is crucial for analyzing a variety of economic issues relating to firm or industry competitiveness and the impact of public policy upon the performance of the food system. For example, demand elasticities are crucial in defining relevant product markets and measuring market power in antitrust enforcement activities. Also, detailed product level demand elasticities would allow more meaningful benefit-cost analyses of nutrition and food safety issues such as HACCP programs for particular food processing technologies. Based on the work on fat perceptions, meat products that have relatively large and inaccurately high fat perceptions may benefit from consumer education programs. Research results would suggest that consumer education programs be targeted to households with lower educational attainment, single female-headed households, and households in the Northeastern United States, where the respondents had the most inaccurate fat perceptions. However, before implementing any consumer education program, one would need to determine whether the benefits of moving individuals' perceived fat content closer to actual levels would exceed the costs of the educational programs.

Goal 4: To achieve greater harmony between agriculture and the environment

Multidisciplinary Evaluation of New Apple Cultivars
With the push toward planting new apple varieties, some of these may be more disease susceptible and require more fungicides for management or they may be more resistant and help to reduce pesticide use. Disease susceptibility assessment under differing disease pressures provides a baseline for expected performance in a typical year in the region, and helps growers make sound decisions in Virginia and the region, leading to a potential reduction in fungicide usage. This project evaluates the disease susceptibility and resistance and horticultural qualities of new apple cultivars. Disease susceptibility assessment in successive years provides a baseline for expected performance in a typical year in the region and contributes to a solid database for the geographical area covered by this project. Advanced knowledge provided by this project about disease susceptibility and resistance of new cultivars is helping to guide planting and disease management decisions in Virginia and the region, leading to a potential reduction in fungicide usage.

A National Agricultural Program to Clear Pest Control Agents for Minor Uses
The public depends upon minor crops to provide a diverse and healthy food supply. NRSP-4 defines these as all crops except corn, soybeans, small grains, and cotton. The Food Quality Protection Act (FQPA) has defined minor crops as those grown on less than 300,000 acres nationally. Minor crop production is in a crisis due to accelerated pesticide re-registration and potential elimination of a large group of pesticides and their uses currently registered for those crops. The program is critical to growers to support clearance of viable and safe chemical and biological pest management tools. As a result of communication with NRSP-4 contacts and others, buprofezin research was conducted on this project in 2001, establishing a label for whitefly control in greenhouses. This is also the case with pyriproxyfen, which was involved in a 2002 IR-4 research project for mite control on greenhouse grown tomatoes. Other efforts resulted in a higher awareness of needs in Virginia agriculture and use of the NRSP-4 network to seek pest control clearance support. As pest management strategic plans are developed in Virginia, NRSP-4 data will be incorporated into these plans, as was the case with the Christmas tree and apple plans developed in 2002.

Impacts of Compost, Manure, and Commercial Fertilizer On Soil and Water Quality, and Crop Production
The short term benefits of using compost as a soil amendment to improve soil properties and increase crop yields have been documented, but farmers are hesitant to substitute compost for fertilizers or manures because the long term economics have not been determined. The environmental benefits of substituting compost for fertilizer or manure have not been resolved. The purpose of this study is to compare the agronomic, economic, and environmental effects of compost, manure, and commercial fertilizer as soil amendments and nutrient sources. Composting has been proposed as an environmentally sound tool for treating organic wastes prior to land application because the process destroys pathogens and weed seeds, stabilizes organic matter, and reduces the solubility (and, hence, leaching potential) of nitrogen. High rates of compost are required to supply plant-available nitrogen requirements of corn during periods of rapid growth, and thus, to achieve optimal yields. As a result, continuing mineralization of compost nitrogen when plants are not actively taking up nutrients can lead to increased nitrate

leaching. When applied at rates required to supply the nitrogen needs of crops, composts with higher concentrations of plant available nitrogen will generally result in less rapid accumulation of potentially detrimental soil phosphorus concentrations than composts with lower plant-available nitrogen.

Water Quality Issues in Poultry Production and Processing

Controlling and reducing phosphorus losses from agricultural soils amended with poultry waste is a major environmental concern for Virginia. In this project, field and laboratory investigations will be conducted to characterize the chemical behavior of phosphorus in Virginia's soils amended with commercial fertilizer and poultry waste and to evaluate the potential for phosphorus losses from Virginia soils having various levels of phosphorus as a result of previous or current management. By 2005, many farmers must comply with the Virginia nutrient management regulation, which includes limits on phosphorus (P) applications to sites with high or very high P loss potential. Farmers participating in voluntary NRCS water quality improvement programs are frequently required to comply with current the current NRCS Nutrient Management Standard as a condition for receiving cost share funds. This also requires a P loss assessment. Results from this work will be incorporated into the Virginia Phosphorus Index, which can be used to determine and rate the site specific P loss potential. This work is essential in order for farmers in Virginia to comply with Virginia Nutrient Management regulations and the NRCS Nutrient Management Standard. The results will also be used to develop management strategies for reducing water quality impacts of P applied as fertilizer and/or organic sources.

Goal 5: To enhance economic opportunities and the quality of life among families and communities

Assessing Impacts of Welfare Reform on Individual, Family and Community Well-Being in the Rural South

Many single female-headed families in rural areas face the loss of public cash assistance payments under current welfare reform measures. This project examines changes in the economic well-being of non-metropolitan single female headed families with children during the implementation of welfare reform measures. Implicit tenants driving changes in social welfare policies in the U.S. are that able adult family members, including single parents, should work to support their families and that by working their families should be able to escape poverty. Yet in 2002, 36 percent of persons below the national poverty line were in families where adult members worked on average more than 1000 hours per year. This represents a substantial increase from 28 percent of persons in poor families with the same level of attachment to the workforce in 1982. By contrast, in the rural south the share of the poor in working families has remained essentially constant at around 36 percent over the same period. Understanding the characteristics and conditions that allow working families to move out of poverty is crucial for the development and implementation of welfare reform initiatives that both promote workforce participation and reduce poverty. Policies to reduce poverty among working families are especially important in the rural south due to high rates of poverty among working families.

Rural Labor Markets and Economic Development in Virginia
Rural areas in Virginia and the nation often show lower levels of economic well-being. This project examines rural labor market behavior in order to identify constraints to economic well-being. The last two decades has seen profound changes in social welfare policies in the U.S. Implicit tenants driving these changes are that able adult family members, including single parents, should work to support their families and that by working their families should be able to escape poverty. Yet in 2002, 36 percent of persons below the national poverty line were in families where adult members worked on average more than 1000 hours per year. Tailoring current assistance programs to better support the needs of these working poor families can help to further strengthen workforce attachment, while protecting the well-being of poor families. However, generating effective reforms requires a firm understanding of the particular assistance needs and concerns of working poor families. Since the rural south continues to show the highest overall rate of poverty of any region in the country, identifying and addressing constraints to public assistance utilization and increased economic well-being among low-income working families in the region is particularly important.

Rural Economic Development: Alternatives in the New Competitive Environment
Rapid economic change and devolution of responsibilities is forcing rural communities to address problems of poverty, underemployment, and opportunities for disadvantaged citizens in new ways. These problems have implications for other government functions such as providing public services and stimulating economic development. The purpose of this study is to examine how federal and state welfare reform policies affect local governments and suggest ways that localities can assist the process of transition from welfare to work. Recent economic downturns are not as likely to induce a substantial increase in program participation; this saves state and federal resources. Food stamp participation can be enhanced (and well being improved) through better advertising and information provision.

Clothing Expenditures of Black and White Families: Research to Provide Information for Apparel Firms and Policy
The purpose of this project is to determine the effects of the income and demographic characteristics of American black and white families on their clothing expenditures. The research is being conducted to provide improved information for apparel marketers' and policy makers' decisions that impact the spending on this important product category by the increasingly diverse American consumer population. The results on racial or ethnic groups' clothing expenditure determinants are useful to apparel companies in view of U.S. consumers' increased diversity and the increased competition that has led the firms toward a stronger marketing orientation and so more need to understand consumer behavior. The expenditure allocation results are useful for policy-makers involved in transfer-payment and other programs and for the courts in alimony decisions.

Osteoporosis and the Health of Virginia's Older Women: Issues and Consequences Affecting Quality of Life
The lifestyles of older women are physically, psychologically, socially, and economically challenged by their health problems. This project examines the health and well-being of older women living in southwest Virginia. The purpose of this study is to examine the functional, psychological, and social consequences of living with health conditions, such as osteoporosis and

chronic pain, and to identify management strategies the women use to maintain a satisfying quality of life. Approximately 200 professionals and 100 community residents attended presentations on rural older women's health issues during the reporting year. Information from the project also was shared with 20 Extension agents as part of an in-serve training program. An article highlighting the findings of the larger study appeared in Aging Today, the bi-monthly publication of the American Society on Aging (ASA). This publication is sent to the 6000 gerontological researchers, educators, clinicians, and practitioners; the article also is available to the general public through the ASA website.

The Virginia Adolescent Resiliency Assessment

Given recent occurrences of violence, community members are becoming increasingly concerned about the well-being of their youth. This project will examine the prevalence of youth risk and protective factors specific to individual communities. At the community level, data from the project have been used to change school policies and to increase out of school time opportunities for youth. They have also been used in securing over $300,000 in grant funds. These funds have been used for a wide variety of purposes including implementing drug and alcohol intervention programs, purchasing fitness equipment, securing school counselors, purchasing curriculum, and implementing smoking cessation programs. Partnerships established as part of the VARA process are still in place. At the state level, VARA data has been or is being used in seven master's theses (three completed, four in process), six presentations at academic conferences, four journal publications, and five additional manuscripts that are currently under review.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution Virginia Polytechnic Institute and State University
State Virginia

Check one: ____ **Multistate Extension Activities**
____ **Integrated Activities (Hatch Act Funds)**
__X__ **Integrated Activities (Smith-Lever Act Funds)**

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
1. To achieve an agricultural production system that is highly competitive in the global economy.	**$390,000**	**$499,000**	**$641,000**	**$600,000**	
2. To provide a safe and secure food and fiber system.	**50,000**	**129,000**	**142,800**	**14,000**	
3. To achieve a healthier, more well-nourished population.	**17,000**	**16,000**	**5,400**	**6,500**	
4. To achieve greater harmony (balance) between agriculture (production activities) and (stewardship and protection of) environment.	**142,000**	**166,000**	**144,400**	**118,000**	
5. To enhance economic opportunities and the quality of life among families and communities.	**90,000**	**17,000**	**32,000**	**225,000**	
Total	**$689,000**	**$827,000**	**$965,600**	**$964,000**	

Judith H. Jones **3/1/04**
Interim Director **Date**

Form CSREES-REPT (2/00)
Note that the approved target of 14% was attained.

Brief Summaries of Integrated Activities (Smith-Lever Act Funds)

Goal 1: To achieve an agricultural production system that is highly competitive in the global economy

Development of Model Scombrotoxin Control Procedures for Commercial Atlantic Fish Species

Other states involved: MD, NC

Numerous factors involved in the formation of histamine in scombrotoxin fish species are being investigated to determine post-harvest handling and processing procedures that can reduce or eliminate scombroid poisoning. Environmental and product sampling has been conducted at fish processing facilities in Virginia involving both yellowfin tuna and mackerel species. Two more facilities processing yellowfin tuna have been scheduled for this year. Standard protocols for the detection and quantification of histamine-forming bacteria have been established so that collaborating school will be able to combine data in this study. Microbiological tests show that histamine-forming bacteria can be found in approximately 20% of samples from processing areas and on the products. No samples of fish currently tested have exhibited histamine concentrations higher than 15ppm. Histamine levels of 50ppm have been determined as the level at which putrescine and cadaverine should subsequently be tested, but has not been needed to this point in the research. The use of radioisotope substrates will also be used to determine the activity of histidine decarboxylase in both histamine-forming cultures and in fish tissue. This data will be used further to determine what measures can be implemented to decrease the activity of histidine decarboxylase though innovative processing methods including high pressure processing. Temperature abuse is also an important factor in the production of scombrotoxin in fish and therefore monitoring post-harvest temperatures is essential to the study of biogenic amine formation in scombroid fish species. Preliminary tests of temperature data recorders indicated that size of the device is important in ensure correct use. Fishermen will be using these devices on the boats with prior instruction from researchers, but no direct supervision at time of insertion. New temperature data recorders have been procured and will be used in subsequent studies to produce an accurate temperature history of the fish from the time of catch to the time of processing. The correlation of time and temperature to the amount of histamine-forming bacteria and histamine in fish will be used to establish safe handling practices for industry. The results will be delivered through representatives of the Cooperative Extension Service and Sea Grant Marine Advisory Personnel. These individuals will transfer project information through various methods including the publication of refereed journal articles, publication of popular articles in various industry and consumer publications, presentations at industry associations and technical and scientific meetings. Also information will be presented at the International Boston Seafood Show and other regional and national industry meetings. Biogenic formation has been identified by the U. S. Food and Drug Administration (FDA) as one of the four major food safety issues associated with the consumption of fish and shellfish products. Under-served and under-represented audiences are all seafood consumers. Therefore, this project provides equal benefit. The project is in-progress and sufficient results have not been received for dissemination purposes. However, as previously stated, the results will be brought to the attention of regulatory agencies, industry, and consumers.

Evaluation of Holsteins, Jerseys, and their Reciprocal Crosses for Lifetime Economic Merit
Other states involved: KY
Virginia Tech and the University of Kentucky are conducting a joint crossbreeding experiment in dairy cattle involving Holstein and Jersey cattle. We are using the same foundation sires to establish the genetic lines and are following similar protocols in collecting data on crossbred and purebred performance. We intend to merge data and publish jointly whenever possible. Our oldest calves are not yet a year old, and another two years will be required to fully establish the genetic lines. We submitted our first abstract for summer professional meetings this year. Dairy producers struggle with declining fertility and increasing health costs as we continue to select intensely for higher production and improved type in purebred dairy breeds. Inbreeding depression is partially responsible for the observed decline, but unfavorable genetic correlations with yield traits are probably even more important. A growing number of dairy producers have already turned to crossbreeding to alleviate these problems, but research results on expected response are quite dated. Dairy cows have changed considerably since the last crossbreeding projects in the United States were completed in the early to mid 1970's. Our project is intended to provide carefully measured performance against purebred controls. Other projects are currently underway, but none use a diallele design with both pure breeds available as controls. I struggle to define under-represented audiences among dairy producers. Grazing dairies may represent one such audience. The importance of fertility and low input technology (such as healthy animals requiring little medical care) to such producers, and the potential of crossbreeding to improve these traits implies a benefit of our project to such producers. The project is yet in its infancy – incomplete breed groups and young animals preclude meaningful results at this stage. An interim statistical analysis showed that breed groups did not differ in the difficulty with which pure and crossbred calves were born or in the incidence of mortality among the breed groups. Birth weights were significantly different, with purebred Holsteins showing the largest birth weights, purebred Jerseys the smallest, and crossbreds intermediate. Jersey sired calves out of Holstein dams were slightly larger than Holstein sired calves out of Jersey dams.

Wine Grape Cultivar, Clone and Training System Evaluations
Other states involved: NY, NC
This project is a collaborative research and Extension project with personnel in New York State and North Carolina to evaluate performance of grape cultivars and clones under growing conditions of NYS and VA. The physical conduct of research is in VA and NY; however, North Carolina has participated by partial funding of the research. Preliminary results have disseminated via regional industry meetings: 1) February 14, 2003, Virginia Vineyards Association annual technical conference, Charlottesville, VA, and 2) March 17, 2003, Wineries Unlimited, Lancaster, PA. The project is a direct result of industry surveys conducted by P.I. to gauge research needs. The research addresses strategic issues of the eastern US wine industry, including how grapevines should be trellised and trained for optimal yields and quality, what cultivars are appropriate for the eastern Piedmont of Virginia and North Carolina, and what clones of specific cultivars perform best in New York and Virginia. We anticipate that the knowledge generated from this collaborative effort will have impact throughout the eastern US. Research conducted at the Southern Piedmont Research and Extension Center in Blackstone VA is specifically aimed at providing varietal recommendations for the eastern Piedmont of VA and NC. Clientele in this region are interested in grape production as an alternative to tobacco or other agronomic crops. The easiest documentation is to use annual National Agricultural

Statistics Service data to show trends in adoption of specific cultivars within states and regions of states. We have issued industry surveys in the past to assess the adoption of cultural practices (such as training systems), and such surveys will be used once we have summarized research data and issued recommendations.

Timber Harvesting

Research investigating the specific causes of logging accidents and types of injuries incurred for each logging worker classification (skidder operator, timber faller, etc.) is used to develop targeted logging safety programs that are delivered to Virginia loggers through our statewide logger training and education program (SHARP Logger Program). Logging is a hazardous occupation, and worker safety is a critical issue to the forest industry. A significant percentage of the logging workforce (estimate 25-30%) is made up of under-served audiences. An expected outcome is a reduction in the injury rate for loggers. We determine the annual logging injury rate (# of injuries per 100 workers per year) each year through examination of cooperating Workers Compensation Insurance provider's records. This rate (TCIR, or total case incident rate) has decreased from 10.0 in 1996 to 5.1 in 2001.

Goal 2: To provide a safe and secure food and fiber system

Use of High Hydrostatic Pressure Treatments to Eliminate Vegetative Pathogens in Fresh Crab Meat

In the U.S., federal agencies responsible for public health and food protection established a zero tolerance for *Listeria monocytogenes* in cooked ready to eat foods. Over the past several years, crab processors in the Mid-Atlantic States have been involved in federal litigation in federal court concerning the presence of *L. monocytogenes* in fresh crab meat products. Several Virginia crab processing companies have been severed with consent decrees. The use of High Hydrostatic Pressure (HHP) to eliminate these pathogens in cook ready to eat foods is promising. It is currently being used to ensure the quality and safety of other ready to eat foods by processing companies in the U.S. and around the world. The purpose of this project is to evaluate the effectiveness of HHP to eliminate *L. monocytogenes* and spore forming pathogens from fresh crab meat and fully cooked shrimp. The Sea Grant Network will be used to disseminate results to interested parties throughout the U.S. The Sea Grant Marine Advisory Service Units and Virginia Tech Cooperative Extension will be used to send the results to processors in all states. The is a key critical issue for the domestic crab processing industry. The FDA has established a zero tolerance for *Listeria monocytogenes* in cooked ready to eat foods. This program addresses the needs of the seafood processing industry in the mid-Atlantic region of the U.S. Fishery product processors are facing increasing demands to improve the safety and quality of their products. Food safety is a national priority and the potential for bioterrorism has increased the emphasis placed on food safety and quality assurance. The study objectives include: 1) determining survival curves and D values for three strains of *L. monocytogenes in* pure cultures and in crab meat; 2) determine D values for the three strains in crab meat with added Nisin; 3) determine effect of HHP and Nisin on spoilage bacterial numbers and shelf life of the treated crab meat. Timelines for project progress are identified in the proposal. Expected outcomes on pathogen destruction, quality, and shelf life of treated products are also listed in the timeline. At least one peer reviewed publication will be produced from this study. Presentations

will be given at industry meetings, industry trade shows, and national scientific meetings such as IFT or IAMFES.

Molecular Ecology of Pathogens in the Turkey Processing Industry
Other states involved: NC, MI, CA
The project is funded by the National Alliance for Food Safety and Security (NAFSS) and the participants include North Carolina State University (lead institution), Virginia Tech, the University of California at Davis, Michigan State University, and the USDA-Agricultural Research Service (ARS). The purpose of this project is to investigate the prevalence of select bacterial pathogens, including *Listeria monocytogenes*, *Campylobacter* spp. and *Salmonella* spp. in the turkey processing industry. We are systematically examining environmental and raw product-associated contamination at eight different turkey-processing facilities distributed among three distinct geographical regions of the United States. The study will provide baseline information that may assist the industry in continuing enhancement of food safety. This study will be used to identify relevant critical control points for these select pathogens in turkey processing plants, and to aid in developing methods to effectively eliminate these pathogens from the processing environment. The results of this project will be provided to turkey processing companies and industry associations to help them identify and contain potential problem areas in processing plants and to develop early management plans. The project is ongoing. Results can not be shared until project is completed in 2005.

Goal 3: To achieve a healthier, more well-nourished population

Childhood Obesity in Virginia Schools
The project involves the study of the prevalence of overweight children in selected schools in Virginia. We worked closely with local Extension Agents to identify schools and obtain support for the study. The intent was to collect this information, so that Extension Agents could use these data to justify and drive local programming efforts in the area of food, nutrition, and health. The results were just finalized, however they will be provided to Agents, then used to develop educational programs for schools. Childhood obesity is a growing concern in the United States and in Virginia. This research/extension project addresses a critical issue. The study focused on areas with high Latino populations. This will be determined, once the educational program is finalized and evaluated.

Goal 4: To achieve greater harmony between agriculture and the environment

Environmental Management System for Poultry Producers
Other states involved: GA, PA
The objective of the program was to see if an Environmental Management System (EMS) could be useful for agricultural producers, specifically poultry producers. Three states participated in the pilot project—Virginia, Pennsylvania, and Virginia. Each state took a slightly different approach and used different documents and delivery approaches. Pennsylvania used a third-party inspector system, Virginia used a producer-driven model, and Georgia used a combination of both. In Virginia, an advisory committee made up of government agencies (Department of Environmental Quality and Department of Conservation and Recreation), Virginia Cooperative Extension, poultry industry representatives, Virginia Farm Bureau, and Virginia Poultry

Federation helped with the development of the EMS instrument. The program was delivered to poultry producers through face-to-face workshops that the poultry integrators helped to organize. Follow-up was accomplished by phone, email and a webpage. Surveys were completed immediately following the workshop and again six-weeks later. Producers indicated that the program did offered ways to protect the environment but most felt that poultry regulations were protective enough and they lacked the time and financial resources to implement another record-keeping program.

Development of Pest Management Strategies for Forage Alfalfa Persistence
Other states involved: LI, IN, KY, MD, MI, MN, MO, NE, NY, OH, OK, PA, SD, WI, WY
Stresses such as unfavorable growing conditions, interference by weeds, and injury by pests significantly shorten alfalfa stand life. The goal of this project is to improve persistence of forage alfalfa stands by implementing ecologically-based pest management strategies. The project addresses a recognized concern among alfalfa farmers about the lack of stand persistence. The extent to which the project addresses the needs of under-served and under-represented audiences is not known. Project outcomes and impacts are identified and documented in the NC-226 report submitted annually to CSREES (see AD-421 Progress Report). The following represents specific outcomes resulting from the Virginia aspect of the study.

Differences in yields and forage quality between potato leafhopper-resistant and non-resistant alfalfa varieties were rarely significant and often inconsistent. Few instances were observed where '54H69', the potato leafhopper resistant variety, performed better than 'Choice, the non-resistant variety, which was far less than expected given the seed premium of $24.15 per acre for '54H69' at the time of planting in 1999. Surprisingly, 'Choice' appeared to be equally competitive against '54H69' in terms of yield and forage quality at both sites, but caution should be used in interpreting these findings until a full cost/benefit analysis of the data can be completed. Other researchers have reported generally positive performances of alfalfa varieties marketed as being resistant to potato leafhopper (Lefko et al. 2000a, 2000b, Sulc et al. 2001, Hansen et al. 2002). However, these studies were conducted in the northeast and Midwest U.S. To our knowledge, our Virginia study is the first to be conducted on potato leafhopper resistant alfalfa in the more southern regions of the U.S. The contrast between our results and those previously reported by other researchers may reflect differences in geographical regions or other factors, such as alfalfa weevil pressure found in Virginia. Based on our study, we recommend that farmers considering investing in potato leafhopper resistant alfalfa should wait until seed companies substantially improve the level of potato leafhopper resistance in these varieties, which will probably be achieved within a few years as "third-generation" varieties are commercially available now. Farmers wishing to try leafhopper-resistant alfalfa now should consider planting only a small portion of a field to judge its performance on site. Any stand planted with a leafhopper-resistant variety should be managed for alfalfa weevil and potato leafhopper in the same manner as any conventional alfalfa stand. This includes following recommended insect scouting procedures and using established economic thresholds before taking a pest management action, such as early harvest or insecticide application. The elimination of insecticide application for potato leafhopper did not appear to improve the pest management for either alfalfa weevil or potato leafhopper within either variety. In addition, our results suggest that insecticide application for alfalfa weevil and potato leafhopper did not always improve yields and forage quality as expected. Greater differences in yields and forage

quality were expected given that insecticide treatment clearly reduced both alfalfa weevil and potato leafhopper for several weeks following application. We are unable to explain why insecticide application failed to improve yields or forage quality. Sufficient pest pressure due to one or both pests was present each year, and insecticides were generally applied within an appropriate period in those instances when pest densities exceeded the economic threshold. More detailed studies are needed to identify why differences in yields and forage quality between treated and untreated varieties were not more dramatic. Possible explanations include severe drought conditions in 2002, a higher than expected tolerance to pest pressures in the untreated varieties, and the possibility that the economic thresholds for either alfalfa weevil or potato leafhopper, or both, may need to be re-evaluated for Virginia.

Comparison of Water Quality and Rainbow Trout Production in Oxygenated and Aerated Raceways

Increasing water quality restrictions on solids discharge from trout farms are being enacted by state and federal agencies. Trout producers interested in expanding production but confronted by more restrictive solid effluent regulations are hopeful that injecting pure oxygen may be an effective strategy to improve water quality and increase trout production. We have assessed the use of small-scale oxygen injection systems at Wytheville State Fish Hatchery and at a commercial trout farm in Virginia. We found significant decreases in effluent solids loadings and significant increases in trout carrying capacity. These integrated research-extension results are available as a M.S. Thesis and World Aquaculture Journal article and are presented to trout farmers in public workshops and popular articles in the news media. This project directly addresses the strategic issues of trout farmers who requested and partially supported this effort sponsored by the aquaculture industry CFAST initiative. Trout farmers are a relatively small, rural under-served and under-represented agricultural related industry in Virginia. Oxygen-injection significantly improved water quality by reducing effluent solid loadings by 1.9 g/L/day, and significantly increased raceway trout carrying capacity by 1,138 kg/raceway economically. The five-year economic benefit (net present value) was $17,924/raceway in oxygenated than aerated raceways. Simultaneous improvements in downstream water quality and trout carrying capacity will encourage the adoption of oxygen- injection systems by the trout industry and promote cooperation between the industry and water quality regulatory agencies.

Goal 5: To enhance economic opportunities and the quality of life among families and communities

National Community-Based Program Sustainability Study

This sustainability study has been funded by USDA since 1996 and seeks to examine factors the effect the long-term viability of community-based programs. Findings from the research are published in professional periodicals, posted on the USDA CyferNet web, and are presented at the annual meeting of USDA's Children, Youth, and Families at Risk Initiative. Since 1996 this applied research has been identified by Extension professionals at national, state, and local levels as important for their understanding the mechanisms important for sustaining programs for families at risk. The project was formed to support programs targeted to at risk families. Most of the Youth at Risk and State Strengthening projects are sustained. In the Youth at Risk study, 70% of projects are sustained six years after their initial funding ended and almost 90% of State Strengthening projects are sustained two years after their initial funding ended. These findings

are radically different from what previous researchers have reported – that most programs do not last more than five years beyond their original funding. Merely providing programs does not necessarily make projects sustained. There needs to be a continuation of the original goals (in the case of these projects – reaching at risk youth and their families) and a level of activity that demonstrates that services are continuing to be provided for those for whom it was originally targeted. CES as an organization is uniquely structured to assist in both the development and continuation of programs geared toward at risk youth and families. As seen from the findings in our studies, the involvement of CES is integral to the continued goal of reaching at risk youth and families. As time goes on for the projects in these studies, we see a pattern where CES is providing more leadership to these projects and integrating programs targeted to at risk youth and their families into the Cooperative Extension system. All seven factors in the Sustainability Framework are empirically related to program sustainability, though the strength of those relationships varies. The relationship of project obstacles to decreased levels of sustainability provides further support to the efficacy of four of these seven factors (Leadership Competence, Understanding the Community, Adequate Funding, and Staff Quality and Involvement). There is substantial concurrence between the Sustainability Conceptual Framework and the Program Sustainability Index (PSI). Thus far, analyses of the PSI provide confirmation for the conceptual framework as evidenced by the congruence between items within and between the factors in the index.

Virginia's New Communities Project

Virginia's New Communities Project includes a statewide effort to improve the quality and quantity of comprehensive community based programs for at risk audiences with a focus on youth and adult leadership, community development, and civic engagement in three specific community sites: Williamstown/Dumfries/Triangle Dumfries, VA; Mt. Herman Community, Portsmouth, VA; and Yorkville Community, Fairfax, VA. This project will provide a statewide infrastructure of support to the communities from 1890 and 1862 professionals resulting in stronger families and healthier communities. Virginia's New Communities Project will enhance leadership skills of both youth and adult residents, strengthen life skills within youth, and expand programs benefiting low-income families in the targeted financially distressed communities. The intent of the project is to create a core of community leaders and equip them with skills needed to address and seek solutions to critical community issues. Twenty-three community residents have successfully completed the Community Voices training. Project Directors and site coordinators were involved in delivering the training. The primary training curriculum used was North Carolina A&T Community Voices Program.

An evaluation of leadership skills acquired through the Community Voices program was conducted using a pre-post design. The following are the results from the pre-participation Community Voices Training Session surveys. Participants were asked to identify their perceived skill rating utilizing a list of 15 leadership skills as defined by the state design team. Participants were also asked to assess how often they practice the skill in a group setting. In terms of skill rating, the average fell between 2.86 (somewhat capable) and 3.68 (capable) overall. The average for how often practiced falls between 2.63 (sometimes) and 3.53 (most of the time). On a scale from 1 to 5, these averages fall right in the middle and that shows that there is room for improvement in their leadership skills. Thirty-seven percent of the participants indicated that their reason for being there was to learn. By people indicating this, it shows that the participants

are excited about being there and want to get something out of the training. Eighteen percent of the people also indicated that they hoped that their talents and skills would be valued even though they all come from various backgrounds. A post survey will be conducted at the end of the Community Voices sessions to determine leadership skill changes.

In addition, as a result of continued collaboration and networking with other non-profits, foundations, and government agencies, over $300,000 has been generated by the Project Director this year to support and sustain programs for youth, children, families, and communities at risk. Partnerships with Virginia Tobacco Settlement Foundation, FACETS, US Department of Justice, and Chesapeake Management have increased our efforts to outreach to at risk audiences. Significant contributions have been realized through collaborations. Over $100,000 has been generated through inkind contributions from collaborators (i.e., space, phone expenses, supplies, staff, and travel). Three-hundred fifty volunteer hours (valued at $6,125 - $17.50 per hour) have been contributed to NCP programs. Volunteer tasks have included leading youth groups, distributing food, teaching ESL classes, chaperoning youth trips, and planning senior citizens outing.