Virginia Tech and Virginia State University
Agricultural Research and Extension
FY 2004 Annual Report of Accomplishments and Results

The following is the Virginia Annual Report of Accomplishments and Results for 2004. 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 is 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. Summary reports are developed from the individual reports.

Data Summary for 2003-2004 Programs

Based on data from the Planning and Reporting System, there were 4,878,835 contacts in VCE programs during the period July 1, 2003 through June 30, 2004. There were 319,036 extended learners who spent at least four hours (six hours for 4-H membership) per year in a VCE educational program. There were 32,275 volunteers assisting Extension staff in delivering these programs during the reporting period**.** These volunteers contributed 788, 874 hours during the reporting period. Tables 1 presents a summary of contact and volunteer data by Extension program area.

Table 1. 2003-2004 Contacts and Volunteer Data by Program Area (July 1, 2003-June 30, 2004)

Program Area	Total Contacts	%	Volunteers	%	Volunteer Time (hrs)	%
4-H	1,361,361	28%	21,080	65%	507,630	64%
Admin.	47,531	1%	406	1%	7,570	1%
ANR	2,356,009	48%	6,289	19%	202,290	26%
FCS	1,113,934	23%	4,500	14%	71,384	9%
Totals	4,878,835	100%	32,275	100%	788,874	100%

This report was written by six different authors: four for the five national goals and one each for stakeholder input and multi and joint activities. Therefore, 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 2004 accomplishments in assuring that our state's agriculture is highly competitive in the global economy. Progress in 12 theme areas is presented for goal 1.

- Agricultural Competitiveness
- Animal Production Efficiency
- Aquaculture
- Biotechnology
- Diversified/Alternative Agriculture
- Infectious Diseases
- Niche Markets
- Plant Genomics
- Plant Germplasm
- Plant Production Efficiency
- Rangeland/Pasture Management
- Turf

Numerous 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 areas 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 with 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

Agricultural Competitiveness

Enhanced Biocontrol of Insect Pests in Limited Resource Greenhouses. Greenhouse production of vegetable provides an alternative source of income to small and limited resource farmers during the colder months. Insect pest control is a major problem. 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 Virginia State University (VSU)/Agricultural Research Service (ARS) project aims to address 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 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 of natural enemies, mites in sachet bags, in advance of spring thrips adults invasion into three commercial greenhouses reduced thrip 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. These studies were continued in 2004. Two (2) research publications were developed and findings were presented to farmers at VSU's Annual Agriculture Field Day. Best practices materials are being developed for educational programs and distribution by extension agents.

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. This 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. Research in the second year (FY2003) of this project, pollen was determined for the eastern subspecies of the Blue Orchard Bee in central Virginia 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. Two research presentations on research results was made at the Annual Meeting of the Entomological Society of America, and preliminary results presented at three VSU's Annual Agriculture Field Day with well over 300 farmers, producers and others in attendance each year.

Production of Vegetable Soybean for Direct Human Consumption. This VSU/ARS project is a follow-up project 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 indicator(s) in predicting the proper stage of harvest. The demand for vegetable as fresh or frozen is 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. Three research publications were developed and published from this three year research study in FY2004.

Marketing Clubs Increase Producer Knowledge on Futures and Options. Nineteen farmers participated in the Eastern Virginia Marketing Club. The main purpose of the club was to teach producers how to use futures and options to manage price risk. The club met nine times. Evaluations were completed following the last meeting. Sixteen participants, representing over 20,000 acres of crops, completed the evaluation. Fourteen farmers indicated that their participation in the club increased their knowledge of futures markets and options significantly, and two indicated that their participation had increased their knowledge somewhat. About half of the participants indicated that they understood futures and options well enough to begin using them in their marketing plans.

Determinants of Rural Poverty Economic growth during the 1990s contributed to substantial reductions in poverty in some areas, but in other areas, poverty actually grew. Little is known about the relationship between economic growth and poverty reduction and cases where growth does not reduce poverty. This project in the Virginia Agricultural Experiment Station (VAES) examines the determinants of changes in poverty between 1990 and 2000 in the rural U.S. Factors such as economic change, human capital attainment, policy shifts, etc. are being examined. The overarching objective is to understand how and why poverty increased or decreased in the rural United States between 1990 and 2000. The project uses census and current population survey data to examine the determinants of changes in poverty between 1990 and 2002. Information is derived on how common policy variables affect and influence levels of and

changes in rural poverty. This work helps to enable decision makers to formulate poverty-reducing strategies.

Rural Labor Markets and Economic Development in Virginia. Rural areas in Virginia and the nation often show lower levels of economic well-being. This VAES project examines rural labor market behavior to identify constraints to economic well-being. The general objective of this project is to develop quantitative frameworks for explaining labor market behavior in rural areas and apply these frameworks within the state of Virginia and nationally. The last two decades have 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% 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.

Quantifying Environmental and Economic Risks of Crop-Livestock Systems. Crop-livestock systems can pose threats to water quality (environmental risk) due to improper management. Investments in intensive rotational grazing systems, manure storage, renovation of loafing lots, and better manure spreading equipment may entail large costs which increase the financial risk exposure of the livestock operation, while potentially decreasing the environmental risk. The overall objective of this VAES project is to incorporate economic and environmental risk assessment into crop-livestock system management. The goal is to facilitate explicit incorporation of economic and environmental risks into management of crop-livestock systems. Every source of nonpoint pollution cannot be treated; therefore, priorities must be set to treat those areas that can bring about the largest reduction in pollution for the least cost. Effective targeting of pollution control funds requires knowledge of both environmental risk of pollution and financial risk of investing in water quality protection practices. Combined analyses of environmental and economic risks, such as those conducted in this project, provides information that can aid in more effective use of public funds and increase adoption of water quality protection practices.

Animal Production Efficiency

Beef Quality Assurance Educational Program. Buyers of Virginia feeder cattle want to purchase feeder cattle with known health and genetic background certified by a third party. Approximately 675 beef producers have received training regarding improving the quality and safety of beef, and evaluations indicated that 77% of them intended to make management changes to improve beef quality as a result of the training. Approximately 3,200 feeder cattle have been sold through the Virginia Quality Assured Feeder Cattle program, a cooperative ear tag certification program involving Virginia Cooperative Extension, the Virginia-Maryland

Regional College of Veterinary Medicine, and the Virginia Cattlemen's Association. Feeder cattle certified by the program received an average price premium of $20 per head, for a total of $64,000 over similarly graded feeder cattle.

Graded Feeder Cattle Sales and Tele-Auction Marketing. Owners of feeder cattle – those cattle on feed to prepare them for slaughter – are often prevented from receiving top dollar for their animals because the relative disadvantage the independent farmers have in relation to the large corporate buyers. Virginia Cooperative Extension sponsors an innovative tele-marketing cooperative sales program in which cattle from a number of farms are graded and sold together in load lots (50,000 pounds). This program allowed producers to earn an average of $40 more per head than they would otherwise have expected.

Genetic Selection and Crossbreeding to Enhance Reproduction and Survival of Dairy Cattle. Many dairy producers are experimenting with crossbreeding to improve survival, fertility, disease resistance, and dystocia. This VAES project intends to quantify difference between purebred and crossbred animals for these traits. The overall objective is to explore the impact of crossbreeding on the lifetime performance of cows. Researchers are developing crossbred strains within the Virginia Tech dairy herd by crossing Holstein bulls on Jersey dams and Jersey bulls on Holstein dams by artificial insemination. Animals born will be retained in the herd to record phenotypic performance for a wide variety of characteristics including early calfhood survival, heifer fertility milk production, mature cow fertility, and survival. While some data collection procedures such as blood samples at birth will deviate from commercial management standards, the intent is to compare performance of purebred and crossbred for lifetime economic merit under routine dairy management strategies. Many dairy producers are considering or have implemented some form of crossbreeding in their dairy herds, but expectations of results are dated or not available. This crossbreeding will allow producers to estimate breed and crossbred differences for health, fitness, fertility, productivity, and survival under a confinement management system. As several of these traits have low heritability and will respond slowly to selection, crossbreeding may offer a more rapid method of improving cow performance in the short term, and may produce more profitable cattle across entire productive lifetimes.

Extension Dairy Genetic Program. Genetic merit of cows in Virginia is improving, and genetic improvement in lifetime net economic merit is the goal of the Extension dairy genetics program. USDA routinely publishes a genetic index of dairy cows called Net Merit Dollars, which is a measure of lifetime net income from genetic ability. From July 2003 to July 2004, the average Net Merit of 55,375 cows in 395 herds on supervised DHI test was $147, and had increased by $24 per cow from July 2003. An additional 9183 cows in 71 herds on unsupervised DHI programs had improved by $23 in Net Merit. Total increased net income for cows in tested herds in Virginia from genetic improvement was in excess of $1.5 million dollars. Cows in untested herds (approximately 35% of the Virginia cow population) also improved genetically, but cannot be documented in this way. Many factors contribute to genetic improvement of Virginia's dairy cows, but increased profitability is the primary goal of the extension dairy genetics program. Extension education is credited for sustaining and encouraging this change.

Aspects of Early Embryonic Development and Maintenance of Pregnancy in the Goat. This VSU/ARS project serves to meet the increasing growing global demand for meat, and to assist small and limited resource goat producers to supplement and increase their income. Goats have difference 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. Three years of research was completed on this project effective September 30, 2004. Findings from this research are presently being developed into best management practices for distribution by extension to assist sheep and goat producers in Virginia and the mid-Atlantic region. One research manuscript from this research has been reviewed and submitted for publication. Additionally, research findings from this study were also presented to producers in 2003 and 2004 at VSU's annual goat/sheep expo.

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, forage-based research experiment conducted indicates that hair sheep lambs grew faster and consumed more forage than meat-type goats under the conditions of 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 (3) 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 attendances at these events. In 2004, this project addressed the relative reproductive performance of meat goat and hair sheep breed types under an 8 month, accelerated breeding systems, and evaluated the post weaning growth performance of the offspring produced in these matings when fed high forage rations. A second component of the project evaluated the use of two sire breed types (Boer and Kiko) mated to land-race goat breeds (Myotonic and Spanish) under a similar accelerated system for the production of crossbred kids. In a production system based primarily on native grass pasture and hay, without access to browse, hair sheep may provide a more efficient production alternative than meat goats. However, differences were detected in the carcasses from the two species, with a generally higher level of back fat in hair sheep compared to the goats. These differences in carcass fat content and well

entrenched ethnic consumer preferences may well override any advantages in production efficiency under certain market conditions. Two research publications were developed from this research, and preliminary results were also presented to producers at VSU Annual Goat/Sheep Expo. This project terminated effective September 2004. Recommendations and best management practices (BMPs) to goat and hair sheep producers are being finalized for maximum impact.

Aquaculture

Fish Health Biosecurity. State and Federal agencies have a high concern about fish pathogens being spread from farm to farm, state to state and country to country. Many farmers are not aware of these new biosecurity issues. During the past two years Virginia State University has conducted aquaculture field days (2003 and 2004) for fish farmers and other participants to provide information and training on fish health biosecurity for fish farms. The farmers were encouraged to develop a fish health biosecurity plan for their aquaculture facility. Post program evaluation of farmers that participated in the fields days indicate that there is an increase in awareness of biosecurity issues on their facilities and that the majority are now considering the use of a biosecurity plans for their farms. One farm that has an active biosecurity plan in place will save the farm an estimated 5.2 million dollars per year by preventing the introduction of pathogens that would result in farm quarantine.

Fish Health Certification. The process for obtaining fish health certification by farmers to enable them ship fish interstate and for markets in foreign countries is generally burdensome. Farmers are fraught with limited knowledge about the process and the high costs associated with the testing of the fish required to ensure absence of pathogens. The most costly aspect of the fish health certification is the virology. To help expedite the process for fish farmers in the state, a Virginia State University Fish Health Specialist developed protocols for obtaining fish health certification for the University's Fish Health Diagnostic Laboratory from USDA, APHIS. The certification allows Virginia State University to perform laboratory procedures for testing selected fish pathogens such as Whirling Disease and forward the test results to the State Veterinarian for issuing the fish health certificate to the farmer in Virginia. This would result in time and financial savings for fish farmers who would otherwise pay for parasitological examination and the bacteriology for a sixty fish sample. The certification process developed in 2004 should reduce the cost by $500 for each farmer desiring a fish health certification to ship fish. Since the initiation of the protocols in September 2004, one farmer has obtained certification for shipping trout out of State and to China.

Fish Health Diagnostic Lab. 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.

Biotechnology

Genetic Improvement of Aquaculture Stocks. Genetic improvement of striped and hybrid bass and tilapias would contribute to the efficiency and profitability of commercial aquaculture operations. Four to six families representing each of six geographic stocks of striped bass are being evaluated for their survival and growth performances in recirculating aquaculture systems. Their utility for producing high-performance hybrid striped bass is being assessed. Linkages of genetic markers with cold tolerance and growth rates in an f2 family of tilapia are being sought. Working collaboratively with Blue Ridge Aquaculture (Martinsville, VA), a hybrid tilapia stock was selected for rapid growth and white body coloration. Three generations of selective breeding led to a silvery-white, rapidly growing stock with improved survival rate and feed conversion efficiency. A genetic map for tilapia containing 214 segregating was developed. Work with the University of Maryland and Fins Technologies (Turners Falls, MA) was aimed at identifying and utilizing the best approach to selective breeding of striped bass. Evaluation of three Chesapeake Bay stocks showed significant stock, among-family, and within-family variation for growth rate that could be exploited by selective breeding. Evaluation of five stocks (FL, SC, MD, NY, and NB) at two facilities showed significant stock, family, and facility effects, leading to a plan for developing a synthetic stock combining genetic material from the best-performing stocks and families. The Blue Ridge stock of white tilapia now dominates live sales in markets in Baltimore, New York, Boston, and Toronto. The live-sale market now being filled, Blue Ridge now will have to target the fillet market. A breeding plan has been developed for producing a rapidly growing gray tilapia, most likely a crossbred, with a high dress-out percentage. Cryo preserved semen from selectively bred striped bass males will be marketed to producers of hybrid striped bass, who will produce back-cross hybrids using eggs from select F1 hybrid females.

Participatory Assessment of Social and Economic Aspects of Biotechnology. Informed decisions on public investments in agricultural biotechnology research and policies to support the use of resulting products can only be made when stakeholder concerns are identified and benefits and costs associated with using the technologies are clearly delineated. This project provides policy makers and the public with information on the benefits, costs, risks, and tradeoffs associated with the use of products arising from biotechnology research on tobacco and rice. Objectives were to (1) elicit and document stakeholder (producers, consumers, input suppliers, rural communities, and others) expectations and concerns with respect to biotechnology research on the tobacco and rice. (2) Develop and apply a framework to assess the positive and negative economic and social impacts of agricultural biotechnologies on tobacco and rice, including their distribution among different interest groups both domestically and abroad. (3) Develop and test educational materials to extend information on the benefits, costs, and concerns associated with biotechnologies to students and the public at large, while at the same time creating a mechanism for continual feedback to scientists working in the biotechnology area. Participatory appraisals

(PAs), focus groups, and surveys will identify expectations and concerns about biotechnologies in the United States and Asia. The Pas include producers, consumers, input suppliers, agricultural/biological scientists, private investors in biotechnology, and environmentalists. Focus groups are used to facilitate group discussion among respondents who may have differing viewpoints. Impacts include increased knowledge by the general public on the potential benefits and costs of biotechnology on rice and tobacco and more informed regulations governing plant-based pharmaceuticals in the United States. Impacts of rice biotechnologies in Asia help public decision makers in that region to make more informed decisions on research support, and help U.S policymakers project market impacts of Asian adoption of rice biotechnologies.

Breeding and Genetics of Barley for Increased Productivity, Value and Durability. Development of plant varieties with disease and insect resistance ensures an ample, safe and high-quality food supply with less reliance on pesticides. This project provides producers with wheat and barley varieties possessing superior end-use traits and resistance to pests. Doyce, released by Virginia Tech in 2003, is the first winter hulless barley variety that will be grown commercially in the eastern U.S. during the 2004-2005 crop season. This unique barley provides poultry and swine producers with a low fiber, high starch, and high protein feed stock, and also has great potential for use in production of renewable fuels such as ethanol as well as in production of foods having specific health related benefits. Collaborative research involving public and private sectors continues to focus on identification and incorporation of value added traits into small grain varieties to improve end use quality and marketability. Hulled and hulless varieties having lower levels of phytic acid content are being developed to increase grain digestibility and phosphorus availability in barley and in turn to reduce manure-related phosphorus pollution.

Diversified/Alternative Agriculture

Alternative Enterprises for Tobacco Farmers. Virginia State University extension faculty conducted applied research and 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, 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 800 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. Twenty-five former tobacco farmers are now producing and marketing at least an acre of seedless watermelons as a result of our field demonstrations. Net income from seedless watermelons has been $1000+ per acre, when the melons are sold in local markets. Thirty landowners have

established naturalized populations of American ginseng and/or goldenseal in their privately owned woodlands. Fifteen former tobacco farmers have established cut flowers as a new source of supplemental income. Twenty farmers have begun raising poultry, beef cattle or swine for selling as "natural meats" in local markets and directly to consumers.

Infectious Diseases

Characterization, Detection and Management of Phytophthora Species in Recycled Nursery Irrigation Water. Water recycling is of critical importance to the nursery industry but it returns some serious infectious plant disease pathogens to water reservoirs, and then spreads them onto the same or new crops. This VAES project identifies the major Phytophthora species in recycled nursery irrigation water in Virginia and develops innovative detection and management strategies. Further, this project promotes sustainable growth of the nursery industry in an environmentally sound manner. Ultimately this project will improve the current water recycling system and promote sustainable growth of nursery industry in an environmentally-sound manner. Researchers developed an assay for detecting multiple Phytophthora species including P. ramorum, the causal agent of sudden oak death. This new assay is being considered as the official protocol for national survey of ornamental nurseries, forests, and recreational parks for Phytophthora ramorum, an important quarantine pathogen. Adoption of this protocol will minimize false diagnosis and generate much additional invaluable data about other Phytophthora species that may be present in plant samples. The project provided important technical assistance to the Virginia Department of Forestry and National Park Service (Shenandoah National Park) in their effort to survey for sudden oak death pathogen in Virginia.

Using Grape Fungicides Wisely. Powdery mildew is potentially the most destructive fungal disease of grape in Virginia. Fungicides are necessary to manage this pathogen. The newer fungicides, such as the sterol inhibitors and the strobilurins, are initially very effective but they also have specific modes of action. That specificity increases the potential for pathogens to develop resistance to the fungicide. Resistance development is increased if the fungicides are not wisely used. Misuse can include exclusive use a fungicide, using insufficient rates, or excessively extending the interval between sprays, etc. A goal is to delay the appearance of resistance in Virginia vineyards by diligent use of resistance avoidance measures. To that end, efforts of the last several years have included efforts to educate clients on resistance issues. Educational programs have included resistance management topics at the annual, in-depth winter program, a discussion in the March-April Viticulture Notes, and reminders by the extension specialist at area extension meetings held throughout the growing season. Growers are advised on canopy management and application techniques to ensure thorough coverage, the need to rotate or tank-mix fungicides, and the need to shorten spray intervals. The impact of this educational effort is that there has been no documented, widespread failure of sterol-inhibiting or strobilurin fungicides in Virginia vineyards in recent years. The occurrence of powdery mildew that has been observed (5 to 10 cases are brought to our attention each year) can typically be explained on the basis of insufficient coverage.

Niche Markets

Fresh Cut Flowers. The primary emphasis of Virginia Cooperative Extension agriculture programs at Virginia State University is development of new enterprises that landowners may use to increase the profitability of their farming operations. One enterprise that is especially promising for small-scale and limited resource farmers is production of fresh cut flowers. A commercial operation can be established on less than three acres of land using family labor for planting and harvesting the crops. Virginia currently has a large established cut flowers industry but it is primarily a marketing industry. Wholesale and retail florists throughout the state sell several million dollars of cut flowers each year that they buy from growers in California, Central America and Holland. There are only five large commercial cut flower operations in Virginia. These few growers produce less than one percent of the volume of product that is sold. Consumers purchase cut flowers throughout the year for weddings, funerals, Valentine's Day, National Administrative Assistant Day, Mother's Day, flowers for patients in hospitals, as wedding anniversary gifts and simply for household decoration. The demand for cut flowers for hotel lobbies, restaurants and business venues is increasing. These are high value crops. Typical wholesale prices paid for bunches of cut flowers are $2.00 to $8.00 for ten stems depending upon the species and season of the year. To build a successful cut flowers operation, beginning growers need to acquire skills in production, marketing and business management. Virginia State University conducts an annual Virginia Cut Flower Growers Conference, an annual Cut Flower Growers Field Day and field demonstrations at VSU's Randolph Farm and on several private farms. Educational presentations about commercial production of cut flowers were made at local meetings across Virginia. Individual consultation was provided by phone, mail and farm visits to support beginning growers. Over 80 Virginia landowners have established cut flowers on a small careful scale of ¼ acre to one acre of production. These growers earned average net income of $8000 from marketing fresh cut flowers. They are encouraged to begin marketing directly to consumers at farmers' markets and directly to the retail florist shops and restaurants. A few have become large enough to make volume deliveries to one of several wholesale florists in the state.

Plant Genomics

Determining Genetic Relationships among Peanut Species with Molecular Markers. The narrow genetic base in peanut results in yield loss due to diseases and insects. Current commercial peanut germplasm can benefit from genetic resources in its wild species. However, the extent of relatedness of the wild species to the crop is not well understood and thus our knowledge of which wild species could be most successfully used in the breeding programs is limited. This project uses molecular markers to define genetic variation and relationships in the peanut genus. The cultivated peanut, *Arachis hypogaea* L., is the most widely grown seed legume in the world, with major contributions to global consumption of both oil and protein. Over 600,000 ha are grown in the USA, and collectively 20 million ha in 82 countries. Approximately one-third of the potential production is destroyed annually by diseases and insects. Finding disease and insect resistance genes in the crop is difficult because the extremely narrow genetic base (germplasm base) of the crop. The potential germplasm resources necessary for improving A. hypogaea are found in many wild species of the Arachis. Quantifying the degree of genetic variability in peanut and understanding the degree of genetic relationships between it and the wild species in the genus are most important steps for breeding resistance.

This application of gene sequencing as molecular markers is a new approach for this crop. The markers identify the various genomes in the cultivated and wild species and help us assess degrees of genetic relatedness. Results obtained are contributing important guidelines for peanut breeding programs. Showing the different genetic contributions from the nuclear and cytoplasm and the new relationships between the peanut genome type and the other genomes are important findings to science.

Role of Endoproteinases during Programmed Cell Death in Plants. Programmed cell death, such as that which occurs during leaf, flower and fruit senescence, is a major contributing factor in crop yield and quality. This study characterizes proteinases that are essential enzymes regulating programmed cell death. Proteinases induced during a developmentally programmed cell death event in higher plants have been purified and used to produce anti-proteinase antibodies. These antibodies are used to determine the subcellular location of proteinases using electron microscopy immunolocalization techniques. Genomic clones encoding cell death proteinases are being identified using nucleic acid probes from DNA clones for the characterization of promoter regions. This project provides the first demonstration that the genetic model plant Arabidopsis is also a powerful model system for identifying genes important to wood formation. Significant accomplishments include the construction of the first DNA libraries from xylem and bark of Arabidopsis and the identification and characterization of peptidases with xylem-specific expression patterns. Random sampling and sequencing of 500 clones from each library indicated that Arabidopsis secondary vascular tissue produces a gene expression profile that is very similar to that reported for poplar xylem and bark. That Arabidopsis and poplar vascular tissues exhibit similar expression profiles supports the conclusion that Arabidopsis will become an important model for altering the characteristics of wood harvested from economically important tree species. Because it is possible to introduce new genes into Arabidopsis and determine their impact in less than six months, research using transgenic Arabidopsis and aimed at revealing the role of programmed cell death as a factor contributing to wood quality and quantity, can be completed in far less time than required for similar approaches using less convenient tree models.

Plant Germplasm

Development of New Potato Clones. Potato growers in the eastern U.S. and Canada need better-adapted, pest-resistant cultivars to serve the large and diverse markets in the region. A major goal of this research is to improve yield and/or quality and reduce negative environmental impacts while maintaining the growers' profitability. Germplasm trials consisted of 11 entries from the single seed source of the NE1014 project with an additional 75 round-white, 17 red-skinned and/or yellow fleshed and 17 russet clones or cultivars representing 6 breeding programs. Marketable yield of Atlantic, B1806-8 and NY25 exceeded the standard in the early-midseason trial. Percentage of tubers exceeding 83mm was greatest for AF1569-2 but tubers of the high yielding, light yellow-fleshed B1806-8 were more attractive. Other trials addressed specific grower needs. In the trial testing yield, tuber quality and wireworm resistance of Solanum tuberosum x S. berthaultii x S. etuberosum back crosses, marketable yield of the backcross selections exceeded that of the wireworm resistant parent. However, additional improvement in tuber appearance is needed for commercial acceptance. Internal and external tuber defects were a concern for several entries. From the regional trial of 31 clones (NC, VA,

NJ) comparing selection location (ME or NC), neither selection location was consistent in identifying clones adapted to the mid-Atlantic region, but the increased selection locations increased the number of clones retained for advanced evaluations. In a growth chamber study under 24C day and 22C night temperature, expression of internal heat necrosis (IHN) in a susceptible clone was consistent. This will facilitate additional studies into the physiology related to expression of IHN. Fifteen percent of potato acreage in Virginia was left unharvested in 2004, primarily because of internal tuber defects. Based upon 2003 price estimate (most recent available), approximately $1.16 million in revenue were lost. Development of clones free of IHN and high in high specific gravity from new sources of germplasm will allow growers to address the main-to-late season chip markets without the risk of poor tuber quality.

Plant Production Efficiency

Production of Herbaceous Perennials in Greenhouses. The goal of this VAES program is to generate and provide growers with the cultural information necessary to efficiently produce a variety of herbaceous perennial crops under greenhouse or nursery conditions. Total gross receipts herbaceous perennials sold in the state of Virginia were $91.7 million for 2002. The goal is helping greenhouse and nursery growers make economically efficient and environmentally sustainable decisions regarding cultural practices in the production of herbaceous perennials. This research consists of evaluation of popular species (Phlox and Rudbeckia) and subsequent recommendations for irrigation and fertilizer application frequency, growing media selection, and the use of chemical plant growth regulators.

Asian Soybean Rust (ASR): A New Pest of Soybean Production. ASR has been found in the soybean production areas in Florida. Growers, extension personnel, agri-business personnel, and soybean researchers need to be able to recognize it early in its appearance into other parts of the U.S. Educational materials and diagnostic procedures have been developed and put into place. Fungicide registrations need to be obtained and control strategies need to be developed. This project attempts to reduce the economic impact of soybean rust on U.S. soybean production. Currently there are no resistant cultivars and large losses are expected. There are effective fungicides, identified and used in other countries, that could reduce losses if used in the U.S. Registration of fungicides for use on soybean rust need to be obtained and protocols for their use need to be developed. First responders, U.S. soybean growers, Extension personnel, agri-business personnel, and soybean researchers, need to know how to recognize soybean rust and the pathogen. The Virginia Tech Plant Disease Clinic is equipped and personnel are trained to make a rapid and definitive diagnosis should sample be submitted. In Virginia approximately 600 soybean growers and agri-business personnel were made aware of the biology and threat of ASR to soybean production in Virginia. During September 2004, 120 first responders were trained to recognize ASR in two 6-hour training sessions involving field recognition of diseases present in Virginia soybean fields. A Section 18 request was submitted to EPA for 10 fungicides to be used in Virginia in the event of an outbreak of ASR. An Action Plan and a Response Team was developed for Virginia in the event of ASR detection in Virginia. Virginia soybean growers are informed and being prepared how to handle ASR.

Managing Corn Pests with Seed-Applied Insecticides. New seed-applied insecticides are showing promise as powerful pest management tools for controlling early season pests on field

corn. This pest complex, which consists of wireworms, seed corn maggot, and annual white grubs, attacks corn seeds and seedlings soon after planting. Feeding by these pests leads to reduced plant stand and seedling vigor. Since 2002, 15 on-farm trials have been conducted across eight counties in eastern Virginia. Findings from these trials indicate that Cruiser and Poncho, both neonicotinoid-class insecticides, provide superior control of these pests compared to some at-plant granular insecticide applications. Also, Cruiser and Poncho were recently approved by EPA for use on corn. In cornfields where corn rootworms are not a problem (which includes most of eastern Virginia), using these insecticidal seed treatments instead of granular insecticides could potentially save Virginia corn growers up to $15 per acre in reduced insecticide costs.

Rangeland/Pasture Management

Producing High Quality Hay for Horses. Hay as a cash crop is the educational objective of the Piedmont Area Forage Field Day and Hay Showcase. Producing high quality hay for the growing horse industry and limited resource livestock producers has put more demand on the production of quality hay. To teach area hay producers the about high quality hay production and marketing, Extension worked with 20 local hay producers to take 70 hay samples for forage analysis that was shared with potential buyers at the forage field day and hay showcase. The program resulted in the sale of 95% (approx. 2500 tons of hay) of the hay exhibited in the showcase.

Managing Legumes for Long Term Persistence in Virginia Pastures. The majority of tall fescue in the United States is infected with an endophytic fungus that produces alkaloids toxic to livestock. The introduction of legumes into fescue pastures ameliorates the majority of toxicity symptoms. This project identifies and provides optimum management strategies to maintain alfalfa in tall fescue pastures. Producers who have seen this research are more likely to use improved varieties of red and white clover over cheaper common seed. Improved varieties increase the chances of realizing improved weaning weights, cow reproductive efficiency, milk production, and stocker gains. Although management requirements are high, top producers have been encouraged from this research to incorporate alfalfa into tall fescue. Researchers and extension personnel have seen the potential for virtual alfalfa simulation as a teaching tool and have expressed an interest in using it when improved versions are released.

Assessing the Forage Potential of Crabgrass and Seeded Bermudagrass. Commonly used cool-season grasses have decreased production during the summer months. This project evaluates the ability of crabgrass and seeded bermudagrass to supply forage during the summer months. Seeded bermudagrass cultivars exhibited varying degrees of cold tolerance during a colder than normal winter. Wrangler was the first cultivar to green up and exhibited no winter kill. Tifton 44 (hybrid check), Guymon, Mohawk, KF 194, Mirage, SunGrazer, Pyramid, and CD 90160 were slower to green up, but did not show any significant winter injury. Cheyenne, Ranchero Frio, and Pasto Rico were the slowest to green up and exhibited significant winter kill ranging from 70 to 85% of the plot area. Cultivars exhibited severe winter kill, but they had recovered within two months. Three years of production data indicated that seeded bermudagrass cultivars provided consistently high yields. These data indicate that seeded bermudagrass and crabgrass could supply forage during the summer months in the mid-Atlantic region of the United States. Seeded Bermudagrass and crabgrass allows for sustainable summer

grazing of ruminant livestock in the northern transition zone and provide needed rest for traditional cool-season pastures, which results in stronger pasture sods, reduced erosion and increased animal production per unit area.

Turf

Turf Production and Management. Cultivated turfgrass occupies over 1,368,500 acres in Virginia and has significant positive impact on quality of life. The Virginia Agricultural Statistics Service 1998 survey of the Virginia Turfgrass Industry reported annual expenditures of nearly $2.55 billion for labor, contract services, equipment, supplies, new turf establishment and capital improvements. Significant water, fertilizer, and pesticides are applied annually with potential impact on the environment, non-target species, surface waters and groundwater. Urban green industry professionals can lack the awareness of integrated resource management principles and their role in reducing fertilizer and pesticide use, increasing turf quality, reducing the incidence of environmental insult and maximizing efficient use of resources. Consequences of not educating turfgrass professionals include wasted resource inputs and increased potential for negative environmental impact. As such turfgrass professionals continually require information on efficient production methods that are environmentally sensitive. Primary target audiences include professionals employed or associated with: lawn care companies, sod farms, golf courses, sports fields, municipal grounds, rights of way, highway roadsides, commercial turf and institutional grounds. The goal of the program is for turfgrass professionals to maximize the use of integrated resource management and minimize the potential for environmental insult that could result from inappropriate management. In addition, to provide turfgrass professionals at all levels of expertise, with information necessary to improve their economic viability and production capability.

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	69.97	0.0	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 2004 accomplishments in assuring that our state has a safe and secure food and fiber system. Progress in seven theme areas is presented for goal 2.

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

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 active Extension programs 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

Improved Food Management. Low-income families need to acquire the knowledge, skills, attitudes, and changed behaviors necessary for nutritionally sound diets in Virginia. In 2004, Virginia Cooperative Extension enrolled and trained 3,428 adults and 8,033 youth through the statewide, hands-on Expanded Foods Nutrition Education Program (EFNEP) which is targeted to families with incomes at 150% of poverty or below. As a result 85% of participants improved in their food resource management practices.

The Smart Choices Nutrition Education Program (SCNEP) is the name of the Food Stamp Nutrition Education (FSNE) plan in Virginia that certified trained adult clients to improve

nutrition and food safety. As a result 82% show improvement on one or more food resource management practices, such as planning meals ahead, using a grocery list, and comparing prices to get the best buys.

Improved Food Accessibility. As a result of the Fauquier County Extension educational program focusing on the difficulty for low income families to access food resources when needed, a volunteer network was organized and implemented a process which provided 45,201 pounds of food, valued at $71,869.00 to an average of 130 families per month. 115 volunteers provide 725 hours of service valued at $12,209.00

Increased Flounder and Finfish Utilization. Producers and distributors needed to find ways to extend the marketing of summer flounder for increased profits. Virginia Cooperative Extension demonstrations and educational program increased the marketing options and profits for summer flounder. After experimenting with holding live flounder in tanks which resulted in high mortalities, a new capture technique was demonstrated and flounder was successfully stored in tanks in September and October. 1350 pounds of net flounder was put in the tanks with a low mortality. As a result watermen $1 premium per pound compared to other markets. During December the distributor received $7 per pound for a net margin of $4.20. As a result the distributor in installing three new tanks with heat with plans to hold the flounder into winter for increased value. An additional live flow through tank system is also being built at a local fish hatchery

Multi-Species Hatchery. As a result of Virginia Cooperative Extension educational programs a multi-species marine hatchery is under development in Accomack County. As a result of the Extension's business planning and design program, the $500,000 project received financing and will enhance and encourage the expansion of the fin fish aquaculture industry in the region.

Increased Food Products. As a result of participation in the Cumberland Regional Food Products Program, provided by Extension, 100% of twenty-four Southwest Virginia participants became certified, increased marketing and business skills, and increased income. As a result five new businesses were formed and one learner moved from selling home grown fruit to producing value-added products increasing income by 600%.

Food Handling and Quality

Quality in Dairy Processing. The Food Science Department provided technical and educational support to eight major processing dairies in Virginia including two new state-of- the art aseptic facilities which resulted in improvements in the quality control and production of extended shelf-life refrigerated and shelf-stable fluid dairy products.

Increasing Youth Knowledge In Food Processing. Eight teams including 32 youth increased their knowledge in food quality and processing as a result of Food Science conducting the Food Product Development Contest. 30 high school students increased their knowledge in the processing, safety, and quality areas of dairy foods as a result of the Virginia Dairy Foods Career program.

Improved Wine Quality. The Food Science and Technology Department developed a test for fermentable nitrogen content in wine which is now used by 44% of the 90 Virginia wineries to improve the quality of their wine.

Food Safety

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 played a major role in developing internally adopted principles and conducting training programs for producing, processing, and marketing safe food products.

Virginia Cooperative Extension addressed food safety through workshops with agents, farmers, producers, processors, distributors, retailers, families and consumers. In addition, Extension personnel are working directly with each clientele group on food safety issues. 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, and many others

Improved Poultry Processing. During 2004, the Food Science and Technology Department provided monthly training sessions in western Virginia and West Virginia which resulted in 300 poultry processing employees and industry leaders increasing their knowledge and understanding of the Hazard Analysis Critical Control Points system (HACCP), Safe Quality Food (SQF), and Good Agricultural Practices (GAPs). These principles 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. As a result the microbiological safety and quality of poultry products in the multi-state region has improved.

Food Safety Signage Program. As a result of Extension's coordination and development of food safety placards and stickers in English and Spanish, hundreds of foodservice and retail food establishment have adopted the system of signs which has improved food safety.

Food Safety for Families. In 2004, Virginia Cooperative Extension enrolled and trained 3,428 adults and 8,033 youth through the statewide, hands-on Expanded Foods Nutrition Education Program (EFNEP) which resulted in 66% demonstrating acceptable food safety practices.

Virginia Cooperative Extension enrolled and trained 6,021 adults and 11,735 youth through the statewide, hands-on Smart Choices Nutrition Education Program (SCNEP) which resulted in 65% demonstrating improvement in one or more food safety practices.

Training and Certifying Food Service. 700 food service managers and employees increased their knowledge of proper food handling through participating in Virginia Cooperative Extension's ServSafe Food Sanitation Program. As a result, 88% of the learners successfully completed the food safety certification from the National Restaurant Association which provided necessary workforce skills and business permit for food service enterprises.

Oyster Safety and Validation. The majority of seafood related illness in the U.S. can be attributed to consuming raw or undercooked molluscan shellfish which contain *Vibrio vulnificus* bacteria. Future oyster harvest and processing will require some type of post harvest treatment to ensure product safety. As a result of the Virginia Seafood Agricultural Research and Extension Center's oyster freezing validation study, the state's oyster industry now has a Virginia Health Department approved protocol which allows oysters to be labeled, "*Vibrio vulnificus* free. As a result Virginia processors will be able to enter the market, increase revenues and insure food safety.

Poultry Product Safety. The commercial turkey industry needs to reduce the presence of foodborne pathogens on processed turkey and turkey products. The problem rests with controlling the pre-chill bacterial burden on carcasses entering the immersion chiller and reducing Salmonella and Campylobacter on carcasses during immersion chilling. Virginia Tech and Texas A&M University and USDA/ARS evaluated the effectiveness of pre-chill sites and chiller management practices in commercial turkey processing facilities. Management practices to reduce pathogens on the final product during chilling have been developed and documented. A "Best Management Practices" document which outlines effective management practices at pre-chill sites has been developed and is being implemented in the poultry industry. As a result of these efforts commercial turkey processors have identified methods for achieving microbial reductions on processed carcasses and the industry is providing safer products for its consumers. Additionally, expenses related to food borne illness as well as economic shortfalls related to foodborne illnesses are reduced for the industry and for individual companies involved in such outbreaks.

Safeguarding Animal and Public Health. After a number of food animal-disease outbreaks around the world, one case of bovine spongioform encephalopathy (BSE) in the United States, and the increased threat of agro-terrorism, a national animal identification system were needed to protect human and animal health. As a result of the increased threats, a team including Virginia Cooperative Extension, the College of Veterinary Medicine, and Geospatial Extension developed a plan to lead the educational effort in Virginia for animal identification and tracking. With state and federal animal health officials and Virginia producers the team assisted in the development of state policies and processes for animal identification and tracking in Virginia. The team developed training modules, publications, which will be used to train Extension educators to train producers in the implementation of the animal identification system. As a result, 75,000 animal producers will register their animal premises and identify their animals which will allow a 48 hour trace forward and trace back ability. This system will protect the investment in animal agriculture as well as safeguarding human and animal health.

Microbial Food Safety Risk Assessment and Intervention for Hydroponically Grown Spouts. In FY2002, VSU/ARS established a Food Safety Research Program. The initial project under this Program is entitled "Microbial Food Safety Risk Assessment and Intervention for Hydroponically Grown Spouts." Sprouts are highly value-added agricultural products that can be hydroponically grown the year around. They are in high demand by consumers for their fresh taste, nutritional value, and potential health benefits. In recent years, however, contaminated sprouts have caused numerous outbreaks 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. Enhancing sprout safety is important to Virginia's welfare. 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 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 on 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. In 2004, the second year of this project, it was found that the microbial quality of sprouting seeds could be influenced by seed type and source. Organic sprouting seeds purchased from Internet sources are either less or equally contaminated with microorganisms in comparison to the conventional seeds. Enterotoxigenic B. Cereus is highly prevalent in all types and sources of sprouting seeds. However, its growth during hydroponics sprouting is influenced by both seed type and sprouting method. Despite that B. Cereus does not produce or accumulate appreciable amounts of diarrheal toxins in the home-sprouting devices tested in this study, its potential growth in radish and broccoli seeds are most evident and may reach a dangerous level when using glass-jars for sprouting. Data obtained from this study may be used at either commercial- or consumer-levels for safe production and consumption of sprouts. One refereed journal article on the findings of this study was published in the Journal of Food Science in 2004.

Food Safety for Occasional Quantity Cooks. Food safety for occasional quantity cooks is equally as important as food safety at home or in restaurants. 506 individuals representing community volunteer organizations (including churches, community agencies, volunteer rescue squads and fire departments) across the Commonwealth received 6 hours of training by Virginia Cooperative Extension. As a result 95% were certified for 5 years by the Virginia Department of Health. As a result the individuals and organizations practice safe food handling and receive permits to operate food service programs.

Food Security

Biosecurity for Animal Agriculture. The 2001 outbreak of Low Pathogenic Avian Influenza (LPAI) in Virginia resulted in the destruction of over 4.6 million commercial poultry. While LPAI does not present human health or food safety it can be devastating economically to farmers, poultry companies, and businesses that provide goods and services to the poultry industry. In 2002, LPAI led to the depopulation of 197 Valley poultry farms at an economic cost of more than $130 million. After the outbreak the Virginia Poultry Federation and the poultry

industry asked for help in developing and implementing a Biosecurity Audit Program for all commercial poultry companies. As a result of the work of the Animal and Poultry Science Department, Virginia growers have implemented a Biosecurity Audit program which provides for evaluating biosecurity practices and safeguards animal health.

Safeguarding Animal and Human Health. Due to the increasing food safety concerns, increased agro-terrorism risks, and an increase in zoonoses, the National Animal Identification System (NAIS) is being implemented and is expected to become mandatory. Virginia Cooperative Extension and a team from Animal and Poultry Science, Veterinary Medicine, Dairy Science and Geospatial Extension organized and developed a training program for extension agents to facilitate the voluntary registration of 75,000 animal premises in Virginia. As result animal facilities in Virginia will be included in the NAIS and in the event of a significant disease outbreak, animal health officials will have 48 hour trace back and trace forward capabilities which provide food safety and animal health protection.

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	6.56	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 2004 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
- Nutrition Education for Adults
- Physical Activity and Fitness Programs for Adults
- Nutrition Education for Youth
- Healthy Weights and Fitness in Youth
- Human Health
- Intergenerational Nutrition Activities
- Expanded Food and Nutrition Education Program (EFNEP)
- Smart Choices Food and Nutrition Education Program (SCNEP)

Key Themes

Indoor Air Quality and Environmental Health

Radon. A workshop called, "Radon: What You Should Know," reached 23 people with information about the health risks of radon gas in the home, the implications for buying or selling a home, how to test for radon, and the basics of remediation. Eight of the participants completed the end-of-session evaluation. Of these, all eight (100%) indicated that they have a better understanding of the topic. All eight (100%) also indicated that they plan to make at least one of the four practice changes listed on the evaluation. Practice changes included testing the home, making changes to reduce the levels of radon, contacting a recommended resource for more information, and including plans for radon testing/reduction when building, buying, or selling a home.

Pest Control and Communicative Diseases

Pesticide Safety. As a result of the "2003 Extension Pesticide Safety Educators Workshop," conducted by Virginia Tech Pesticide Programs in Blacksburg on October 14, 2003, over 75 Extension agents learned new technology and information to better serve the citizens of the Commonwealth. The workshop involved 19 speakers and 13 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 course support documents, 15 teaching modules, and 79 PowerPoint presentations to teach clientele aspects of pesticide safety and

technology. Seventy-two agents and four specialists used the on-line course since the workshop (5,757 hits) to enhance their training programs across Virginia and in the region.

As a result of holding the "Virginia Extension On-line Course in Pesticide Safety" conducted by Virginia Tech Pesticide Programs, approximately 55 agents, inspectors, and specialists learned basic concepts of pesticide safety education and were able to attend a three-day course sponsored by the Southern Region Pesticide Safety Education Center at North Carolina State University in Raleigh, NC in October 2003. Included in the on-line course were agents, specialists and inspectors from British Columbia, DE, DC, FL, IA, KS, MD, MN, NE, NY, NC, ND, OR, PA, SC, TX, TN, VA, WA, and WI. In addition to the state agencies and land-grant institutions from many of these states, other agencies included USEPA, USDA (CSREES and AMS) and Agriculture Canada. The Center has sponsored three annual workshops using the Virginia on-line course since 2001. The workshop used the on-line course throughout September and October 2003 (11,355 hits). The on-line course will be used again by the center in October 2004. Those attending the workshop and using the on-line course will use the skills they gained at the workshop to improve pesticide safety education in their states and provinces.

As a result of offering pesticide safety education information to the public through the Virginia Tech Pesticide Programs web sites, the public actively used that service to assist themselves with seeking answers to problems and to fulfill their needs associated with pesticide safety and technology. Users visited the site at an average of 103,445 hits per month. Users downloaded an average of 1.46GB of content/month. Much of the use involved database services such as the pesticide link search service, A/V library, speaker's bureau, image database, and training calendar. Clientele feedback and increased use statistics continue to confirm that this service is important to clientele. Using a software package (Advanced Web Ranking 2.3) that tracks search engine hits, the web site (Virginia Tech Pesticide Programs) consistently ranked in the top 10-20 sites on the web for use by search engines when using keywords like “pesticide” and “pesticide safety” when the report was run on March 18, 2004. This ranking fluctuates from day-to-day and is subject to change, but it does give an indication that the site is popular and competitive on the web with users.

Pest Management. As a result of the Virginia Pest Management Information Program (part of the Southern IPM Center) a stakeholder group (growers, specialists, and agents) published pest management strategic plans (PMSP) for apples (VA,WV, MD, PA, NJ, and DE) and Christmas trees (TN, NC, and VA) in 2004. Those states conducted formal PMSP stakeholder committee meetings in June 2003. The plans were published on the USDA National IPM Centers web site. Five PMSP stakeholder meetings are planned for 2005 (snap beans, tomatoes, turkey, ginseng, and tobacco). All are collaborative efforts between Virginia Tech and North Carolina State University and the stakeholders in those states. These efforts are designed to enhance pest management programs for stakeholders through improved education, research, and regulatory programs and 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 a crop/pest management profile (fact sheet) on alfalfa in 2004 to be used in the development of strategic plans and communicating crop/pest management

needs to the EPA and USDA. This profile was also published on the USDA IPM Centers web site. Five crop profiles are slated to be published in 2004 on pumpkin, squash, cabbage, cucumber, and cantaloupe.

These efforts along with petitions to the IR-4 Project for research to clear new pest controls on minor crops supports crops vulnerable to loss of pesticide registrations through regulation and loss due to economics (cancellation due to costs to register pesticides). These efforts also integrate alternative controls into the process through strategic needs planning with stakeholders. The ultimate impact on agriculture is the availability of viable pest controls and the ability to grow crops that would be otherwise be vulnerable to pests and diseases.

As a result of grants totaling over $80,000 over two years from the USDA Agricultural Marketing Service, Pesticide Recordkeeping Branch, to Virginia Tech Pesticide Programs, a CD-ROM based training module was completed in 2004. That module was distributed nationally by USDA to all states to assist farmers to understand the importance of keeping pesticide records and to encourage compliance with the Federal Food, Agriculture, Conservation, and Trade Act of 1990 (Farm Bill). The content of that module will provide farmers with an additional tool to meet their obligations under federal law and will assist pesticide safety educators in the teaching of the concepts of good pesticide recordkeeping.

A severe stable fly and house fly outbreak negatively impacted milk production in several Southwestern Virginia dairy herds in Spring 2004. Area dairy specialist, Susan Puffenbarger organized a June production meeting that included many of the affected dairy producers. Meeting topics covered stable and house fly biology, pest control, and insecticide resistance management strategies. General fly pest management practices currently in use by each producer also were discussed. The impact of this meeting was that approximately 90% of the producers in attendance adopted a more aggressive approach to fly control through better rotation of insecticides. Ms. Puffenbarger reported improved stable and house fly management as a result of the actions taken by the producers, and that they are interested in exploring other fly management options in upcoming meetings.

Ensuring a Safe and Nutritious Food Supply

Food Safety. In 2003-2004 a new collaborative grant (NC State) was received to continue food safety programming. This is a critical and emerging issue for commercial packers and shippers of produce. Current GAPs (Good Agricultural Practices) food safety measures are buyer driven requirements. As liability and trace back pressure increases, more buyers are requiring 3rd party audits for GAPs compliance. Concern about safety of our food system has increased, and at issue is the potential for microbial contamination in fresh produce, and food system terrorism. Ultimately a lack of inspection could result in grower contract termination. In response to the situation, the Good Agricultural Practices (GAPs) educational program was introduced to over 400 Virginia Growers during the previous FY. GAPs is a collaboratively developed program by multiple states. This training addresses microbiology aspects of food safety, pre and post-harvest GAPs procedures, product trace back and record keeping. Recent focus for our program at VT has been grower preparation for fee-based, on-farm, GAPs state certification program

administered by VDACS, and one-on one consultation about audits with growers and VCE agents. 4-6 growers have been certified and/or are undergoing certification in the state.

Eight hundred and fifty dairy farmers in Virginia and West Virginia were surveyed about their on-farm food safety practices. Forty percent of the surveys were returned. One hundred percent of the farmers who returned the survey indicated that they have changed at least one on-farm practice because of the safe quality food practices training from Virginia Tech.

Forty-five small food processors in West Virginia received bio-security training. All forty-five processors completed the required FDA registration procedure by the December deadline. All forty-five processors are in compliance with the regulation.

Thirty-five cottage/small processors have received food safety and HACCP training. In follow-up telephone surveys, 95% of the processors indicated an increase in sales because they had implemented a safety/HACCP program. One meat processors indicated that they increased sales from 0 to over $30,000 per month and now employ 20 employees.

Food for Thought: A Simulation on Food Security Issues. Specialists in human nutrition and family resource management partnered to develop a poverty simulation workshop for professionals that address the issues of food security and hunger in limited resource families. Participants are assigned a family situation and target level of resources and must follow through on the decision-making process of how to provide (or not) adequate food, shelter, and other necessities for family members. Social workers, school teachers and administrators, government officials, and extension professionals have participated in these workshops.

NRV Area Food Safety Training. Since 1991, Virginia Cooperative Extension and New River Valley (NRV) Health District has maintained a cooperative agreement to provide food safety training throughout the New River Valley in the counties of Floyd, Giles, Montgomery and Pulaski. This agreement was initiated when Virginia Cooperative Extension began teaching the ServSafe Essentials, a 16 hour manager certification course. Previously, the NRV Health District provided food safety training when needed and Extension provided food safety training primarily for home food preparers. Since the Health District regulates food establishments and Extension's primary mission is education, this partnership allows both agencies to combine resources, share expertise, and develop mailing lists to effectively target populations needing training. Three different types of training are provided: ServSafe Essentials targets restaurant managers; Serve Safe Food targets food service workers; and Cooking for Crowds targets temporary food vendors. A mailing list of 600 is maintained allowing brochures describing each course to be mailed as well as a yearly training schedule. Food safety training requests are handled through the Pulaski County Extension Unit and additional sessions are scheduled when pre-formed groups of 15 or more request a food safety training session. Persons successfully completing each course final exam receive certificates valid for three years. A total of 144 courses have been taught and 2,896 participants have successfully completed certification in the food safety program in which they participated. As a result of the partnership, Sarah Burkett, Extension Agent, FNH indicates that she has been able to reach new learners who have not traditionally participated in Extension programming. Other benefits include sharing resources and expertise; increased program visibility; and a decrease in food safety violations in the New

River Valley. Both the ServSafe program and Cooking for Crowds was offered across Virginia during the reporting period.

Consumer Food Safety. Training was conducted for 75 Food Bank staff, civic groups, 4-H volunteers, and Master Gardeners. Hand washing kits and workshops were offered and utilized for school programs, child care trainings, and for 4-H and other volunteers to use in camps, workshops and staff training.

"Germbusters" - a hand washing program was conducted in six Augusta County elementary schools in 2003-04 through a partnership with the schools and the local hospital. Over 2500 students demonstrated increases in hand washing behavior as reported by teachers.

Food preservation information was distributed to consumers during pressure canner testing of 110 gauges. One trained volunteer assisted with testing.

Commercial Food Safety – ServSafe. ServSafe is the industry standard in food safety training and the national certification is recognized by more federal, state, and local jurisdictions than any other food safety certification. VCE partners with Virginia Department of Health to offer this course. The local health departments indicate that they do not have the staff to offer ServSafe courses on their own and they are very appreciative that they can partner with VCE. More than 240 food service managers/ workers were trained through the ServSafe course. National certification was obtained by 88% (215 of 244), insuring that safe food is served at restaurants, schools, hospitals, and other institutions (80% is the national average pass rate). One manager commented "I didn't know eating could be so dangerous!"

Nutrition Education for Adults and Physical Activity and Fitness Programs for Adults

Reducing the Risk of Cardiovascular Disease and Cancer. Curricula with appropriate evaluation tools were utilized for both group workshops and individual at-home learning. Publications addressing healthy eating and the relationships between food intake and chronic disease risk support group activities relating to heart disease and cancer. Food models, test tubes illustrating the amount of fiber, fat, and sugar in common foods and visuals describing the progression of atherosclerosis assist in active learning. PowerPoint presentations were be downloaded from the VCE Intranet. The six issue newsletter series C/O Your Health can help families learn more at home about diet and lifestyle changes important to cancer prevention. The Change of Heart newsletter (6 issues in total) describes lifestyle patterns that contribute to heart health. Representative publications: The Food Guide Pyramid and Dietary Guidelines, Here's to Your Family's Health, Physical Activity… A Healthy Habit for Life, Trans Fat and the Food Label, The Diet and Cancer Connection, Calcium: Build Strong Bones, Know Your Cholesterol Number, and Heart Healthy Eating – Cholesterol, Fat, Fiber and Sodium.

As You Age Curriculum for Senior Adults. A series of nutrition and health materials for senior adults were developed cooperatively by specialists in Human Nutrition, Foods and Exercise and Human Development. This 12 lesson series has application in a variety of settings. Individual lessons were presented as short talks at senior centers or senior meal sites, and PowerPoint slide sets were available for each topic. Several lessons were coordinated in a workshop format, or individual lesson handouts were sent as at-home newsletters. A game board

was developed to accompany these lessons where appropriate. Representative publications: As We Age: Nutrition for Senior Adults, As You Age…..Basics About an Aging Population, As You Age…..Health Basics, As You Age…..Friendship Patterns, As You Age… Eat More Calcium-Rich Foods, As You Age… Eat More Phytochemicals, and As You Age….Curriculum for Senior Adults.

Walking and Physical Activity for Adults and Families. This curriculum provides lessons, background material, handouts, activities with appropriate supplies, and publicity materials for developing walking programs for families and communities.

Diabetes Prevention and Self-Care. A national coalition involving several State Extension groups was formed last year to address diabetes prevention and concepts of meal planning, activity patterns, and self care for those individuals who have diabetes. This material is designed to help diabetics put into practice the diet and exercise patterns recommended by their health professional. The Virginia program is based on the principles and materials adopted by this national group.

Current participation:

Number of Extended Learners*	Number of Meetings	Number of Volunteers	Number of Volunteer Hours	External Dollars Generated#
2,839	309	397	2,466	$7,880

* Extended learners completed a minimum of four hours of instruction.

Agents have garnered funds from various sources to obtain educational materials or supplies that otherwise would not be available. The Virginia Department of Social Services, Community Health Boards, churches, civic clubs, and the Virginia Association of Family and Community Educators have supported this work. Grant funding exceeding $2,000 was received from the American Cancer Society to support a cancer prevention program directed toward the African American community in Mecklenburg County.

Nutrition Education for Youth

Coupled with physical inactivity, dietary trends are contributing to increasing rates of childhood and adolescent overweight, Type 2 diabetes, high blood pressure, and high cholesterol. In an effort to address these issues, the following initiatives were implemented by Virginia Cooperative Extension this past year. The programs reached a total of 4,290 extended learners and involved the recruitment of 311 volunteers (equating with 8,656 volunteer hours) and $16,912 external dollars acquired locally (in addition to state-level grants and funds).

Fit for Life Kids. In 2003, Virginia Cooperative Extension obtained a grant from the General Mills Foundation in the amount of $10,000 to create and deliver educational kits for childcare providers on the topics of whole grains and physical activity. The kits included a leader's guide for the childcare provider, books, parent's newsletters, and related equipment to encourage

consumption of whole grains and physical activity among pre-school children. A total of ten Food, Nutrition, and Health Extension Agents implemented this project with childcare providers in their areas. The data are now being analyzed.

Virginia Action for Healthy Kids. Virginia Action for Healthy Kids (VAFHK) is a statewide coalition, established by Virginia Cooperative Extension, whose aim is to improve the health and educational performance of children through better nutrition and physical activity in schools. Virginia Action for Healthy Kids consists of more than 50 individuals representing governmental, private, and non-profit organizations, including local school districts. The First Lady of Virginia, Ms. Lisa Collis, serves as honorary chair of Virginia Action for Healthy Kids.

Since its inception, Virginia Action for Healthy Kids has:
- Developed and disseminated, to all school districts, nutrition integrity guidelines and a policy template for foods and beverages offered on the school campus throughout the school day.
- Developed a 10th grade nutrition curriculum for health education teachers.
- Created a curriculum resource guide that integrates nutrition and physical activity resources to Virginia Standards of Learning for kindergarten through grade 10.
- Served as an advisory group to the Virginia Commission on Youth legislative group, providing recommendations for the most effective and cost efficient ways to prevent obesity among Virginia youth.
- Identified schools that model "best practices"

Health Quest. The prevention of childhood obesity has recently become a major concern for educators and health professionals in the United States. In 2000, data showed that 15% of American children were overweight, as defined by Body Mass Index (BMI) measurements. Comparatively, here in the Commonwealth, in Planning District 6, a 2002 study showed that 23% of local children were overweight. Thus, in an effort to address the growing programmatic need for health education related to obesity, the Health Quest program developed. The Healthy Weights for Healthy Kids curriculum that had previously been created at Virginia Tech was integrated into the Health Quest program. In addition to experiential nutrition education, physical activity, including the use of pedometers, is integral to the composition of the curriculum. To date, almost 400 youth (aged 6 – 15) have completed the six lessons of Health Quest: Smart Foods, Smart Choices, Smart Activities, Smart Snacks, Smart Drinks, and Smart Image. These programs have been conducted in conjunction with schools, Boys and Girls Clubs, and 4-H groups.

Stephanie C. Diehl, FNH Agent in Rockingham County, shared that the before-school programs with 3rd, 4th, and 5th graders were the most successful. Physical activity was part of each session and children who attended all sessions received a pedometer of their own. The participants in the program were culturally diverse and representative of a school system in which 30% of students speak English as a second language.

Out of the 55 participants, these impacts were recorded:
• 50% increased the frequency of choosing food based on the food guide pyramid
• 40% decreased the time spent on sedentary activities
• 30 – 40% were more likely to choose fruits and vegetables as snacks
• 35% were more likely to help with food preparation at home

When asked about the program, the children remarked, “We learned to eat more fiber and less fat” and “I learned how to make soda – healthy soda!”

This program was a collaborative effort with the school’s nutrition program director and physical education teacher, and service-learning students from James Madison University.

Healthy Weights and Fitness in Youth

Healthy Weights for Healthy Kids. Overweight is growing at epidemic rates among American children and adolescents. Currently, an estimated 15% of children and adolescents ages 6 to 19 years old are considered overweight. Proper nutrition, physical activity, and positive body image are critical for children to achieve healthy weights, optimal physical and emotional health, and their academic potential.

In order to address this growing problem, Virginia Cooperative Extension developed the program, Healthy Weights for Healthy Kids, which targets children in Virginia between the ages of 7 and 14. The hands-on program focuses on six key topics that are critical for all children, regardless of weight - Smart Foods, Smart Choices, Smart Drinks, Smart Snacks, Smart Activities, and Smart Image. Last year a total of 7,610 youth were reached through this program. The program is currently being delivered by Food, Nutrition, & Health Extension Agents and program assistants from the Virginia Smart Choices Nutrition Education Program and the Virginia Expanded Food and Nutrition Education Program in a number of different settings - such as schools, after school programs, and camps. Program impacts are now being evaluated.

Too Heavy, Too Young: Assessment, Treatment, and Prevention of Childhood Obesity. VCE partnered with the local health district and the regional Head Start agency to plan and conduct an educational conference for medical professionals titled, “Too Heavy, Too Young: Assessment, Treatment, and Prevention of Childhood Obesity”. Over 70 medical and health professionals including physicians, physician’s assistants, nurse practitioners, nurses, dietitians, and health educators participated in the conference. The attendees represented local medical practices, hospitals, the health department, and schools. The curriculum was approved for 5.25 CME credits from the Academy of Family Physicians and 5 CEU credits for registered dietitians. Evaluations were positive, and all attendees plan to use the resources received at the conference. The Rockingham County Schools food service director was motivated to conduct research in his school system to determine if school lunches are contributing to the increase in childhood obesity. As a result of this conference, the Health Quest program was developed and has engaged almost 400 children in educational programming.

Human Health

Diabetes. Diabetes is a growing Public Health problem. According to the Center for Disease Control and Prevention (CDC) more than 18 million Americans have diabetes, the sixth leading cause of deaths in the United States. Those most demographic groups affected by diabetes are elderly, women, and certain racial and ethnic groups, such as, African American, Hispanic, American Indian, and Alaska Native adults that are two to three times more likely than white adults to have diabetes. The financial impact of diabetes to this country is staggering nearly $132 billion a year. CDC reports that the yearly health care cost for a person with diabetes in 2002 was $13,243 compared with $2,560 for a person without diabetes. In 2002 diabetes costs

represented 11% of national health care expenditures. Research has shown that good diabetes management can help to reduce or delay complications and thus, the cost of diabetes. Virginia State University conducted a series of five classes under the theme, *Fitting Together the Pieces of Diabetes* to give diabetics and those at risk of diabetes information on nutrition, physical activity and methods for managing diabetes complications. A total of 160 persons participated in the classes. In one group, participants 58% (7/12) were able to reduce their blood pressure by the end of the five weeks and 100% (12/12) indicated they felt confident about keeping their diabetes under control through diet, exercise and proper monitoring.

HIV/AIDS Instructor Certification. In the United States African Americans make up 12 percent of the population yet, according to the Office of Minority Health (OMF) they comprise 51.7 percent of estimated AIDS cases diagnosed in 2002. This rate is almost 10 times the rate for whites and almost three times the rate for Hispanics. According to the Centers for Disease Control and Prevention (CDC), HIV/AIDS is one of the three leading causes of death for both African American men and women ages 25-44. Research shows that the public is well informed about certain aspects the HIV epidemic; most know that there is no cure for AIDS, that there are drugs that can extend the life of those with HIV, and how the virus is transmitted. Most however, don't know some of the key prevention and treatment issues. Education is one of the effective ways to help fight the stigma, fear, and denial that surrounds HIV/AIDS. Those communities disproportionately affected by HIV/AIDS must receive the education, prevention, testing and treatment needed to help stop the spread of the virus. Virginia State University Health Specialist held two eight hour Red Cross Training workshops for HIV/AIDS instructor certification. Twenty-five (25) persons participated of which 92%, (22/25) received certification and are now able to conduct educational programs and provide information on HIV/AIDS.

Intergenerational Nutrition Activities

Suppers Made Simple. Based on research associating family meals with improved school performance, improved dietary quality, and reduced risk of substance abuse, the FCS - 4-H team in Patrick County are partnering with the school system to provide a family-centered program called *Suppers Made Simple*. The program focuses on providing an environment in which families can discover positive ways to learn and work together to improve nutrition and fitness. *Suppers Made Simple* is offered as part of after-school programming and includes six sessions. Each session includes four components: physical activity, meal preparation, dining, and clean up.

In designing the program, much attention was given to preparing an environment and activities that would encourage learners to engage in the four components as a family unit. The whole family is invited to "get moving, cooking, and eating together." No-fuss, low cost, great tasting family meals are prepared by learners and recipes are provided for use at home. Families play together (physical activity), prepare food together, eat together, and clean up together.

Several positive behavioral changes have been reported by parents and grandparents who participated in the program. These changes include eating more meals at home, planning meals more often, including more fruits and vegetables with meals, using suggested recipe/meal ideas, involving children more in meal preparation and clean-up, and spending more time outside being active. Adult participants also reported positive behavioral changes in the children, including

spending less time in front of the television, eating more healthfully than before, and helping more in the kitchen.

Living Well. Virginia Family and Consumer Sciences extension agents were honored to receive a national 2004 Living Well Award at the recent annual meeting of the National Extension Association of Family and Consumer Sciences. The award recognized the excellence of the statewide *Living Well* newsletter in enhancing Family and Consumer Sciences (FCS) professionals' image in the community and was initiated as a part of the FCS program communication strategy.

The *Living Well* newsletter has been a team effort including agents, specialists, and staff across the Commonwealth. As a result, the quarterly newsletter now reaches more than 13,000 families by hard copy, with others accessing it electronically through 91 Unit office websites. Through the newsletter, localities have a mechanism for highlighting FCS programming while helping Virginia residents "raise kids, eat right, spend smart, and live well."

Healthy You. *Healthy You* is an intergenerational program targeting at-risk preschoolers and senior citizens. To address issues of youth obesity and elderly risk for inadequate nutrition, the *Healthy You* program was developed to emphasize the health benefits of eating fruits and vegetables for both children and adults. The program teaches preschool children and seniors about basic nutrition and improved eating habits and the nutritional needs of an elderly population. Participating preschoolers are from the Be-4, Sure Start, Head Start (a Clarke, Frederick, Warren, Shenandoah County Public School program for at-risk 4-yearolds). The volunteer senior citizens are from Clarke, Frederick, Warren County Senior (a nutrition feeding site of the Area Agency on Aging), Mayfair House and Westminster-Canterbury. Over 100 senior citizen mentors were trained to teach simple nutrition concepts in 8 lessons to 128 preschoolers. A follow-up eight month evaluation was mailed to participating families. The changes made as a result of the workshops included: 100% of the four and five year olds could recognize fruits and vegetables from other foods; 89% of the families were trying new fruits; 81% tried new vegetables in the diet; and 85% included fruits and vegetables in the diet each day.

Expanded Food and Nutrition Education Program (EFNEP)

EFNEP covers the salaries of 39 Program Assistants (PAs) who conduct nutrition education in 39 VCE units. EFNEP funds are also used to partially fund the salaries of the Area Coordinators and support staff. Administrative supervision of PAs is provided by the five area Coordinators, but FCS agents with food, nutrition, and health responsibility, some 4-H agents, and a few other FCS agents assist in day to day supervision and in providing subject matter support to PAs. Unit Coordinators also provide day-to-day monitoring of EFNEP and SCNEP staff.

In 2004, EFNEP PAs enrolled 3,428 adults and 8,033 youth into the program. All participants were provided with a minimum of 6 nutrition lessons, but most complete an average of 10 lessons. A 24-hour dietary recall and a Food Behavior Checklist (FBC) are administered when Adults enter the program and again when they are ready to graduate. Intake of food groups and nutrients and food behaviors are assessed to determine improvement from pre- to post-

intervention. Significant improvements and diet and food behaviors are demonstrated show among those participants who complete the program, as follows:

Some behavioral improvements made among EFNEP adult participants during 2004:

- Mean intake of fruits and vegetables increased from 3 servings to 4.6 servings per day
- Iron intake improved from 63% to 72% of recommended level
- Calcium intake improved from 55% to 70% of recommended level
- Vitamin C intake improved from 71% to 85% of recommended level
- 85% of participants improved in their food resource management practices
- 66% improved in their food Safety practices.

Smart Choices Food and Nutrition Education Program (SCNEP)

The Smart Choices Nutrition Education Program (SCNEP) is the name of the Food Stamp Nutrition Education (FSNE) plan in Virginia and is totally operated by Extension. In 2004, it received federal funds in the amount of 3,313,274 and operated in at least 80 of the 110 counties have an Extension office. The SCNEP grant covered full funding for 63 FTEs of Program Assistant (PA) time, while covering partial funding for 13 classified support staff members, 7 FNH-SCNEP agents and one 4-H-SCNEP agent. Both PAs and the 8 agents served as direct nutrition educators of food stamp program (FSP) participants and other low-income adults and youth. The program has continuously resulted in significant improvement among participants on food-nutrient intake and other food-related behaviors.

In 2004, 6,021 adults and 11,735 youth were enrolled in SCNEP and provided with six to ten nutrition lessons each. As a result of the program, fruit and vegetable intake improved significantly. Some behavioral improvements made among adult clients were as follows:

- 87% of participants showed improvement on one or more nutrition practices such as making healthy food choices and preparing foods with less salt, sugar, and fat.
- 82% show improvement on one or more food resource management practices, such as planning meals ahead, using a grocery list, and comparing prices to get the best buys.
- 65% showed improvement in one or more food safety practices.

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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	19.24	0.0	0.0	92.6	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 2004 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 crop protection, pest management, pesticide safety, pest monitoring, forest crops, forest resource management, 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. For the year, 2,356,009 contacts were made for the Agriculture and Natural Resource program. A total of 186,042 extended learners were involved and 6,289 volunteers who contributed 202,290 hours of volunteer time. The value of this volunteer contribution, based on Virginia figures totaled $3,598,739 or 449,842 days of volunteer time.

Water quality can be impacted by pesticides, sediment, nutrient loading, pathogens, and chemical pollution of groundwater, streams, and waterways. Faulty septic systems are a principle cause of groundwater pollution in Virginia. Since parts of Virginia are in the Chesapeake Bay watershed major emphasis has been given to water quality as 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.

Key Themes

Integrated Pest Management

Powdery Mildew and Grapes. Powdery mildew is potentially the most destructive fungal disease of grape in Virginia. Fungicides are necessary to manage this pathogen. New fungicides, such as the sterol inhibitors and the strobilurins, are initially effective but also have specific modes of action. That specificity increases the potential for pathogens to develop resistance to the fungicide. Extension educated grape producers on resistance issues through in-depth

producers trainings, newsletter and in-vineyard grower meetings. As a result there was no documented, widespread failure of sterol-inhibiting or strobilurin fungicides in Virginia vineyards.

Intelligent GIS. Researchers and Extension educators in Entomology combined geospatial information and Internet technologies and developed an Intelligent GIS (IGIS) system for area-wide management of white grub populations in turfgrass landscapes. This system provided for more efficient and effective pest management and pest surveillance.

Fruit IPM and PDAs. Extension educators developed an information system and software which adapts Personal Digital Assistants (PDAs) for use as wireless production and pest management information delivery systems for Virginia fruit growers. As a result fruit growers can access the most effective and up to date pest management and production information.

Aquatic IPM. 100 land owners in Planning District 16 received training in watershed management and using IPM with pond and lake care. Clients reported saving $700 to $1500 per season on the cost of aquatic weed control due to the educational programs and recommendations.

Controlling Carpenter Ants. As a result of researchers studying the carpenter ant, a significant structural pest, an effective new bait has been developed that can be used for the control of household infestations eliminating large applications of pesticides.

Protecting Real Property Investments. Pest management professionals need to conduct proper inspections of real property for real estate transactions and pest control needs. As a result of the Wood Destroying Insect (WDI) Educational Program offered by Extension, 568 pest management professionals have been certified as WDI inspectors by the Virginia Pest Management Association. Certified inspectors result in the protection of property and citizen investments.

West Nile and Mosquitoes. In 2003 the number of West Nile virus cases in the U.S. increased while the numbers in Virginia decreased slightly. A mosquito surveillance program was established for southwest Virginia to identify, characterize, and map mosquito breeding sites. As a result this information is being used to make decisions regarding mosquito control efforts and the placement of light traps to monitor virus activity in the adult population.

Web-Based Fruit Decision Making. Extension developed and updated the Virginia Fruit Home Page to provide commercial and home fruit producers current technical production and pest management information. 660,986 request visits for information were received by the web site this year. 24, 739 visits were made to pages associated with the Spray Bulletin for Commercial Tree Fruit.

Pesticide Training for Educators. Extension specialists, agents, and regulators need readily available information and training related to pesticide safety and use in order to provide training and assistance to clients. Extension developed and coordinated the Southern Region Pesticide Safety Education Center in cooperation with North Carolina State University. 53 agents,

specialists, and regulators accessed the on-line training and 80% indicated increased knowledge as a result of the 15 modules and the on-line testing. Included in the on-line course were agents, specialists and inspectors from British Columbia, DE, DC, FL, IA, KS, MD, MN, NE, NY, NC, ND, OR, PA, SC, TX, TN, VA, WA, and WI. In addition to the state agencies and land-grant institutions from many of these states, other agencies included USEPA, USDA (CSREES and AMS) and Agriculture Canada.

Tobacco Cultivars and IPM. The tobacco cyst nematode is an important pathogen affecting flue-cured tobacco in Virginia, North Carolina and type 32 tobacco in Maryland. Extension specialists working with North Carolina State scientists have developed flue cured tobacco cultivars that are resistant to the tobacco cyst nematode. As a result the cultivars will be used in tobacco production in Virginia and North Carolina and will reduce the need for pesticides and increasing the net value of the crop.

Tobacco Disease Diagnosis. It is critical to correctly diagnose and treat tobacco diseases in a timely manner as crop losses increase quickly. Extension developed a rapid on-site fungal disease detection program and trained all extension agents in the tobacco regions. As a result the speed and accuracy of the diagnosis and control of diseases of tobacco has increased dramatically. The program has provided for quick responses (as little as 30 minutes) and the resulting recommendations and treatments have increased crop protection and reduced economic losses.

Peanut Crop Protection. During the production year Extension stressed the use of weather monitoring equipment/computers in helping control diseases in peanuts. Approximately six thousand acres of peanuts were planted in the city with approximately four fungicide sprays being applied rather than the routine six sprays. As a result of the 1-800 Daily Advisory Program, fewer pesticides were bought and less was applied in the environment. Farmers saved on an average of approximately $14.00 an acre on each spray. Approximately $168,000 was saved in pesticide purchases and thus increased net incomes

Soybean Aphids and IPM. The soybean aphid is a new insect pest in Virginia and can cause serious yield losses. A statewide survey alerted soybean growers that the soybean aphid, a new invasive species from Asia, was found in all major soybean-growing counties in Virginia and populations were controlled in the 3,125 acres where populations exceeded economic threshold levels reducing pesticide use and crop damages.

IPM in Northern Virginia Orchards. As a result of IPM demonstrations and orchard trainings, 75% of the orchards in Northern Virginia used IPM to make decisions and improved the efficiency of their crop protection efforts.

Pesticide Container Recycling. Through a cooperative effort between Virginia Cooperative Extension and the Virginia Department of Agricultural and Consumer Services an environmental protective program, the Plastic Pesticide Container Recycling program successfully recycled an average of 54,000 containers in 18 localities. The program provides for the safe disposal of the containers and protects the environment by saving landfill space.

Unwanted Pesticide Disposal. Through a cooperative program with the Virginia Department of Agriculture and Consumers Services 639,800 pounds of unwanted pesticides were collected from 1,500 participants in 35 Virginia localities and safely disposed of. Virginia Cooperative Extension provided education, surveyed the producers, publicized the program and arranged for local participation. The disposal of canceled, banned or unwanted agricultural and commercial pesticides poses a significant challenge to agricultural producers and other pesticide users due to its high cost. The proper disposal of waste pesticides eliminated a potential threat to health and the environment.

Pesticide Safety Education. As a result of the Extension Pesticide Safety Educators Course, over 86 Extension agents learned new technology, laws and regulations, and best management practices for crop protection and pest control. As a result of Virginia Cooperative Extension's Pesticide Safety Education program 15,000 commercial and private pesticide applicators were trained and certified according to state and federal requirements. This program allowed 15,000 agricultural producers and commercial pesticide applicators to purchase and use both restricted and general use pesticides in Virginia. As a result of the program, risks to public health and the environment were minimized while maintaining crop protection and effective pest control efforts.

Forester Pesticide Certification. Virginia Cooperative Extension sponsored an eight hour pesticide recertification conference designed for natural resource professionals entitled "Woods, Water, Wires, and Wildlife." 132 private and commercial applicators received training and as a result renewed their private pesticide licenses

Plant Disease Diagnosis and Control. Private and public landowners, crop producers, and other individuals needed timely and accurate diagnoses of plant diseases and effective control recommendations. With increases in world travel, agro-terrorism and plant resistance, disease diagnosis and effective control recommendation have increased in importance and are a vital link in biosecurity in Virginia. The Extension Plant Disease Clinic identified 1472 plant samples and provided IPM recommendations. As a result the economic and esthetic impacts of plant disease were reduced in Virginia.

Soybean Rust Mitigation. The economically devastating plant disease, Asian soybean rust is expected to reach Virginia. With yield losses in soybeans up to 80% the risk to Virginia's $100 million dollar soybean crop is significant. Extension organized 3 first responder training sessions which trained 125 professionals, including extension agents across the state. Seven fungicides received emergency registration for use as a result of Extension's efforts. As a result of the Soybean Rust Program, Virginia is prepared to quickly identify soybean rust and will be able to respond to minimize yield losses and economic impacts.

Reduced Pesticide in Landscapes. Virginia Cooperative Extension provided three hands-on disease and insect diagnosis workshops targeted towards regional grounds maintenance personnel, municipal employees, and Master Gardener volunteers... 88% of the participants reported the training gave them information they would use in their daily work with plants and pesticides. The learners rated the disease identification information as the most valuable and indicated pesticide usage would be reduce by 31% as a result.

Effective Disease Control. The specific needs of Virginia's fruit producers for disease control continually change due to resistance to preferred fungicides, potential withdrawal of registrations due to the FQPA, and the need to reduce pesticide usage because of economic, environmental and food safety concerns. Extension demonstration and educational programs forewarned 775 growers concerning the potential for resistance to firelight controls in the coming season. As a result of the training growers were aware of the resistance problems and 75% were able to offset the losses due to resistance problems with effective procedures. .

Increased Use of IPM. 90% of the fifty farmers and agribusiness representatives receiving training at the 16th Annual Five County Ag Conference indicated that they increase their knowledge in the areas of seed treatments, weed control in corn, and glyphosate resistance management.

Over 90% of participants at the Five County Crop Production Conference (attended by over 50 producers representing over 29,000 annual acres of corn, soybean, and small grain production) indicated they had increased their knowledge about conservation tillage, pesticide resistance management, soybean production, and pesticide safety.

Coastal plain producers indicated as a result of educational programs on the production of soybeans and grain crops producers they saved an average of $3.50 to $5.50 per acre on the cost of seed treatments, insecticides, herbicides, and fertilizers which represents a savings of $122,500-$192,500 region wide.

Monitoring Corn Earworm Resistance. The corn earworm, an important insect pest in Virginia that attacks cotton, soybean, peanut, tomato and many other crops, has developed resistance to pyrethroid insecticides. Virginia growers depend on these low cost insecticides when corn earworm populations exceed economic thresholds. A resistance monitoring effort, in cooperation with other mid Atlantic states, to track the level of pyrethroid resistance was conducted. 3,602 adult corn earworm moths were captured over the entire growing season and tested for resistance. Results revealed a very low level of resistance. As a result of this educational program growers were able to maintain the use of pyrethroids as a crop proctectant and employ effective and economic insect control programs.

Reduced Insecticides Use in Soybeans. Each year the corn earworm, an insect that feeds directly on soybean pods, invades soybean fields causing growers to apply insecticide treatments to many fields. The pest population varies from year to year and growers are encouraged to scout field's crop protection needs. The Corn Earworm Advisory uses field surveys and pest monitoring to provide growers with up-to-date information. In 2003, 7,400 ears of field corn were sampled from 143 fields in 29 counties to determine the size of the earworm population and to predict the upcoming threat to the soybean crop. Weekly electronic advisories kept growers abreast of pest development and encouraged use of scouting and other IPM practices. As a result 60% of the soybean crop (200,000 acres) was scouted and 17% was treated with insecticide compared to 85% receiving treatment in 2002. This represents a significant reduction in pesticide use and savings for growers.

Soybean IPM. With the use of soybean IPM forecasting and scouting procedures, 40 soybean producers protected yields on 15000 acres of soybeans from corn earworm with less than 500 acres requiring chemical treatment.

Safe, Effective Application. Approximately 275 individuals have been involved with the sprayer calibration demonstration during pesticide recertification or tobacco production meetings. Additional on-farm assistance has helped identify faulty sprayer equipment that would cause improper spray application of about 10% or $1.50 per acre in additional costs.

Recycled Pesticide Containers. 1049 triple rinsed plastic pesticide containers were removed from the local waste stream as a result of a cooperative effort between Virginia Cooperative Extension, agribusiness, state and local government using an $1800 grant of public funds. Producers for the first time, recycled plastic they would ordinarily burn or dispose of in the solid waste stream.

Landscape IPM. 95% of the participants (77) at the Danville Grounds Maintenance Short Course responding to the program evaluation stated that they would make changes in their pesticide application methods to better protect personal safety and the environment. 50% stated that they have a better understanding of the methods used to identify pest problems in the landscape.

Pesticide Use Changes. Through coordinating and teaching workshop programs in five regional re-certification programs for Commercial applicators, an average of 87% of those responding to the surveys agreed they would change their maintenance practices because of what they had learned at the re-certification program and this will cause a positive impact on approximately 396,908 acres of turf, landscape, right-of-way, nursery, schools, and greenhouse properties.

Pesticide Certification Training. A Pesticide Certification Review of the Core Manual and for categories 3A and 3B provided training for 54 pesticide applicators. As a result of the review, 100% responded that the program improved their knowledge/awareness for the responsible use of pesticides. 100% responded that the program would help them use pesticides more safely.

Pesticides for Minor Crops. The Virginia Tech Pesticide Unit lead efforts related to the IR-4 Project for research to clear new pest controls on minor crops. The ultimate impact on agriculture is the availability of viable pest controls and the ability to grow crops that would be otherwise be vulnerable to pests and diseases.

Turf Best Management. Lawn Manager Workshops (4 sessions) were developed to address the issue that many of the lawn care providers may be applying pesticides illegally and to highlight proper turf management practices. Evaluations indicated that 12 participants planned to obtain commercial pesticide applicator certification and 95 percent planned to make changes to their turf maintenance program. One hundred percent of the participants agreed or strongly agreed they had a better understanding of the proper and safe use of pesticides and fertilizers as a result of the workshops.

Monitoring Pests. As a result of the Virginia Crop Pest Advisory (VCPA), an electronic multidisciplinary pest alert and information provider that was provided weekly to growers, crop consultants and Virginia Cooperative Extension Agents, 500 growers were provided with important and timely information which allowed them make more knowledgeable pest management and crop protection

Reduced Insecticide Use. As a result of 15 replicated field trials in eight counties in eastern Virginia in 2002-2004, the practice of low cost seed treatment standards, such Kernel Guard, against wireworms, seed corn maggot, and white grubs was validated. Two other insecticidal chemistries also showed promise in controlling germinating corn seed pests in Virginia. As a result of the research and education program the elimination of insecticides at corn planting saved growers $15 per acre in reduced insecticide costs.

Mosquitoes and IPM. Mathews County Extension conducted research and provided education concerning mosquito IPM. The project was supported by Mathews County and Mathews Cooperative Extension. The program increased the knowledge of homeowners with identification and control recommendations and monitored the mosquito presence. As a result Mathews County citizens and officials increased their knowledge and understanding of mosquito control. The use of Integrated Pest Management in lieu of spraying is saved thousands of dollars for the county, as well reducing reliance on pesticides, thus saving the beneficial insects that help control the mosquito.

Disease Diagnostic Aid. Peanut growers need timely identification of insects, weeds, and diseases to prevent crop losses. The disease clinic provided a foundation for safe and efficient deployment of pest management practices and was essential for successful crop protection.

Peanut/Cotton InfoNet. Peanut and cotton producers requested current crop advice and pest management information. Growers and industry workers accessed the Peanut/Cotton InfoNet a total of 2,042 times on the worldwide web from June to October 2003. This web site reports provided daily crop advisories and weather summaries for management of peanut and cotton. Reports of soil temperature provides growers with information necessary to properly time soil fumigation with pesticides for disease control, and to determine when conditions were favorable for planting of crops. Early leaf spot and Sclerotinia advisories for peanut improved the efficiency of fungicide sprays, and frost advisories provided up to a 7-day warning of periods when there was a high risk for freeze damage to freshly dug peanuts. The Virginia leaf spot advisory saved an average of three sprays of fungicide compared to programs prescribed in many states in 2003. At an average cost of ca. $13 per acre for each application, the advisory saved peanut growers $1.37 million dollars in production of 35,000 acres of peanuts in 2003. Frost advisories warned growers of periods of high risk for freezing damage. Virginia-type peanuts had an average value of $475/ton in the fall of 2003. Freeze damage would have reduced this value to as low as $143/ton.

Improving Gypsy Moth Monitoring. The Slow the Spread Gypsy Moth Project information system processed 8478 trap sites in the 2004 trapping survey in the STS and VDACS state survey areas. These data were processed, validated, mapped, reported on, and made available via the World Wide Web. This technology has the potential to eliminate 90% of the trapping errors

in the project and this model has applications in Virginia as well as other IPM programs. The Gypsy Moth in Virginia and the Gypsy Moth Slow the Spread project web sites together recorded 1,597,665 requests for information in 2003-2004.

Natural Resources Management

Improving Woods and Wildlife. Extension provided a day-long "Landowners Woods & Wildlife Conference" in Manassas and Charlottesville. 252 individuals representing over 26,000 acres of private land identified at least one specific land improvement action to undertake within the next six months to one year.

Certified Loggers. Seventy loggers received six hours of training as a result of three continuing education programs. As a result, ninety-one percent indicated they would improve their spill control preparedness, 79% felt they had gained negotiation skills and 83% indicated they were better equipped to handle situations where threatened or endangered wildlife is present.

Protections for Landowners. As a result of the "Woodland Options for Landowners" short course in Nelson County, two landowners formed the county's first Ag/Forestal District comprising 2,500 acres and involving 12 landowners. As a result the farm and forest land will be insured of affordable taxes and protected from development impacts for 10 years.

Reducing Logger Injury. The number one cause of injury on mechanized logging operations is being "struck by" a log, limb, or tree while using a chainsaw to manually fell or delimb a tree. Three chainsaw safety programs trained 72 loggers. Loggers purchased the following safety equipment items following the training sessions: log truck signs (6), sign stands (6), sign ribs (6), corded earplugs (2), saw pants (10), peltor hard hat (2), wedges (17), wedge belt/pouch (3), personal 1st aid kits (1), and safety glasses (9). A participant that purchased protective chainsaw pants at the program later credited this decision with saving his life.

Selling Timber. Following a "How to sell your Timber" program in Louisa County, 100% of the survey respondents representing over 6000 acres, indicated that as a result of this program they were better able to earn fair market value for their timber and guard against timber theft/trespass. This program was specifically targeted to African-American landowners, which made up 22% of the participants.

Logger Safety. 114 loggers and foresters received training in entrance permits, flagger certification, and railroad crossing safety through the Roadway Safety Program Series. 108 of 114 (95%) participants successfully passed a flagger certification examination that certified them to flag traffic within state maintained right-of-ways.

Utilizing Forest Resources. Research shows that loggers lose an average of 21% of the timber value harvested in southern Appalachian hardwoods due to undercut, overcut, and otherwise improperly merchandized material in the woods. Thirty participants attended a six hour Log Grading and Merchandising Workshop to learn the importance of bucking for grade. As a result of the training 100% of the learners increased knowledge and skill in harvesting timber according to evaluations.

Improved Wildlife Habitat. 21 forest landowners participated in a 4-week Wildlife series and reported an increase in knowledge of how to develop their property as suitable wildlife habitat and how to minimize problems. Additionally, three participants implemented USDA cost-share programs that they were made aware of as a part of the series.

Logger Best Management. Of the 124 loggers attending the spring Loggers' Field Day, 43% indicated that they had received information which would improve the implementation of Best Management Practices for water quality protection in their operations; 28% learned improved safety practices.

Nutrient Management

Nutrient Management Recommendations. The Virginia Tech Soil Testing Laboratory provided soil test information and customized nutrient recommendations for 41,969 soil samples, representing ~ 500,000 acres. This includes samples from commercial crop production, commercial greenhouse and nursery production, surface mining, golf courses and industrial lawns, home lawns, gardens fruits and ornamentals, and research.

Forage Best Management. The Piedmont Area Forage Conferences had 180 participants that learned the importance of forage nutrient management planning. The program resulted in 10 forage producers requesting plans from the local Extension Office. The 10 plans covered 1200 acres of hay and pasture land that was approved for $12,000 of poultry litter cost-share money and resulted in a $35,000 savings in commercial fertilizer cost.

Turf Nutrient Management. A post survey of participants in the Central Virginia Lawn Manager Workshop showed that 72% planned to use soil testing for fertilizer and lime use, 69% would calibrate application equipment, and 77% would further use Extension resources in their business. Overall 95% indicated that they would change at least 1 practice to help protect water quality.

Poultry Litter Utilization. Virginia Cooperative Extension in cooperation with the Virginia poultry industry-organized a cost-share program for increasing the utilization of poultry litter. Extension agents organized programs in Louisa, Madison, and Fauquier Counties and the Virginia Poultry Federation funded the purchase of three litter spreaders. As a result of the cooperation and Extension efforts, 5400 tons of poultry litter were transferred from the Shenandoah Valley and used as fertilizer in Central Virginia.

Great Scapes Nutrient Management. Prince William Extension and their Master Gardener Volunteers provide a program to citizens called Great Scapes. The Great Scapes program results in homeowners receiving an accurate measurement of their turf areas, a soil test and a nutrient management plan with the goal of protecting water quality and the environment. Homeowners following the plan correctly applied fertilizer at the optimal time for their grass. As a result of the Great Scapes program 1,884,887 square feet or 43.27 acres of private lawns came under nutrient management plans which resulted in reduced nutrient application and improved water quality.

Soil Quality

Tobacco Conservation Tillage. Demonstrations and research efforts validated the strip-till as the most viable conservation tillage production system. As a result of the research and education programs, the number of acres using strip-tillage increased to 100 acres and will continue to grow if tobacco acreage increases in the future. Soil losses are reduced by 50%. Strip-till flue-cured tobacco production reduces tillage passes by 67%, lowering fuel, labor, and machinery costs.

Sustainable Agriculture

Alternative Horticultural Crops. Virginia landowners and growers need new high-value crops to increase net farm income. Climate, geography, and demographics create unique production and marketing opportunities for specialty crop growers. Virginia Cooperative Extension evaluated high-value crop options for direct marketing including bramble cultivars, globe artichoke, and ginseng for woodlot owners, hard neck garlic, cabbage, and fall crown-cut broccoli. As a result of the research and education efforts, new specialty crop acreage is increasing.

Marketing Alternative Crops. As costs of production and the risk to the environment risks increased with traditional animal production, Virginia Cooperative Extension lead Mennonite producers to explore and develop a produce auction with increased fruit and vegetable production. 175 producers participated in the educational sessions. The sustainable agriculture program has enlisted 100 farms in the Shenandoah Valley in the program to become economically and environmentally sustainable and help to accomplish their goals of farmland preservation, improved water quality, and rural economic development.

Alternative Forest Crops. As a result of participation in a two day pilot offering of "Income Alternatives for Woodlot Owners Conference" 85% of the respondents reported they were better able to earn income from their property.

Small Fruit and Specialty Crops. As a result of Virginia Cooperative Extension's work with the Virginia Horticulture Society, the Virginia Direct Marketers Association, the Small Fruit and Specialty Growers Association and the Virginia Department of Agriculture and Consumer Service, the Virginia Grown Conference and Trade Show were held. 225 participants received training in the production of sustainable vegetables, small fruit, and other specialty crops. As a result the specialty crop acreage is increasing.

Increased Marketing of Vegetables. Extension assisted the Northern Neck Vegetable Growers' Association with the organization and management of programs supporting the Northern Neck of Virginia Farmers' Market which for the year 2003 sold in wholesale value $10,320,947.00 of produce.

Increasing Vegetable Production Knowledge. Thirty-two producers participated in the Richmond Area Vegetable Growers Conference and reported an increase in knowledge about

pumpkin production, cucurbit diseases, vegetable pest management and greenhouse transplant production.

Organic Dairy Production. With historically low milk prices, six dairy farmers in the Shenandoah Valley are exploring the potential for organic milk production. Virginia Cooperative Extension agents and specialists provided information to them on the National Organic Program and the requirements for having their farms organically certified. A Soil, Plant, Cow, and Environmental Health Workshop was organized in March to address topics relevant to farmers who are transitioning to organic farm production. As a result six producers are changing to organic operations and plan to increase net income.

New Horticulture Enterprises. Thirty-eight residents each received 12 hours of training in a four-week Small Farm Series to increase understanding of horticultural crop production. Learners were new or small acreage landowners representing 1,009 acres. As a result 98% indicated they had increased knowledge and planned to begin enterprises such as organic vegetables, small fruit production, and backyard nurseries.

Improved Vineyard Sites. Inappropriate vineyard site selection continues to be a fundamental constraint to vineyard production and profitability as the industry develops. With 10 to 20 new vineyards established each year, there is a sustained need to demonstrate and refine the recommendations for prudent vineyard site selection. Three methods were used in the reporting period to that end. A revised, comprehensive site selection publication and regional (VA, MD, and PA) workshops provided the latest information on soil and climate requirements for vineyards. Extension specialists and extension agents provided on-site evaluations. As a result the vineyards that have been established in Virginia in the past 12 months have overwhelmingly been established in good to excellent sites that will face minimal risk of climatic or soil-related problems.

Alternative Hay Crops. Hay as an alternative cash crop was the educational objective of the Piedmont Area Forage Field Day and Hay Showcase. Producing high quality hay for the growing horse industry and limited resource livestock producers has put more demand on the production of quality hay. To teach area hay producers the about high quality hay production and marketing, Extension worked with 20 local hay producers to take 70 hay samples for forage analysis that was shared with potential buyers at the forage field day and hay showcase. The program resulted in the sale of 95% (approx. 2500 tons of hay) of the hay exhibited in the showcase,

Water Quality

Watershed and Stream Improvement. Cooperative Extension organized and implemented a study and analysis of the Rockfish watershed to document the current status. Two interns from Virginia Tech and Old Dominion University systematically mapped and evaluate the Rockfish River as part of Virginia Tech's Student Training in Environmental Program (STEP). As a result local decision makers will make sound decisions concerning water quality improvement and prioritize stream bank restoration work that the study indicated needed to be done.

Reduced Water Pollution. Due to water pollution, officials in Clarke County, VA, are in the process of constructing a sewage treatment system the community of Millwood. A community development block grant for 1.75 million dollars was obtained from the Department of Housing and Community Development, and the system will serve 59 homes, 5 businesses, 3 churches, and 2 community centers. An impaired stream flows through the town and research performed in 2000 demonstrated that fecal pollution from human sources appeared in the stream as it passed through Millwood. The research results and the educational program for local officials resulted in the funding of the grant and the construction of a new system which will protect the environment and human health.

Reducing Coastal Water Contamination. Failing septic systems and leaking sewer lines can impair coastal waters and destroy marine life. Due to research and education from Virginia Tech which demonstrated how fluorometry can detect pollution from human sources, state regulatory officials can now and locate the origin of human-derived pollution. As a result, best management practices can be targeted and specific problems in impaired waterways can be corrected to improve water quality.

Water Quality and TMDLs. The TMDL program, mandated by the Clean Water Act, is a watershed management process that integrates watershed planning with water quality assessment and protection. State and local officials needed technical information and hands-on experience with water quality simulation models which are being used for TMDL development in Virginia. Two water quality modeling workshops provided 12 hours of training including hands-on exercises. As a result of the training state regulatory official reported increased knowledge and high satisfaction with the training results. (Average response 3.5 out of 4).

What Do You Know About Water Quality? Water resource issues are frequently in the news; however, many people lack a good understanding of water quality indicators or how their actions affect the resource. To address this need, the *What Do You Know About Water Quality?* CD-ROM curriculum is being developed. This is an interactive, Power Point game for grades six through adult that challenges individuals' knowledge of basic water quality. The game emphasizes a number of water quality indicators including: dissolved oxygen, pH, hardness, alkalinity, nitrate, phosphate, turbidity and others. Introductory sections provide an overview of water quality processes, terminology, chemical measures/indicators and Virginia's watersheds. Participants are first asked to research a water quality indicator and important facts about their own watershed. There are six games: two introductory games that emphasize general water quality terms and concepts used in the three contest games (Levels 1, 2 and 3) and a Wild Card game that covers a variety of water quality topics. As they play the game, participants win "pollution credits" which they can use for an imaginary cleanup of their watershed. The program also includes a virtual watershed exploration across Virginia and information about home/community best management practices that help protect water quality. Additional information about water quality indicators is provided in the companion publication: "Water Quality Indicators – an introduction to water quality indicators, what they mean and how they are measured". Intermediate and senior 4-H project guides are also planned. The program is currently being piloted and included as part of the Virginia 4-H Master Volunteer training. Pilot testing of the program in 2003 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. Released for public dissemination is planned for the summer of 2005.

Water Quality Education for Youth. The 2000 Chesapeake Bay Agreement recommends that all youth beginning with the graduating class of 2005 have a series of "meaningful" watershed-related experiences that help them connect to the processes and issues of the Bay. The "meaningful" definition refers to extended learning opportunities that include introductory lessons and post-activity processing of field experiences. Fifteen youth educational programs were conducted involving approximately 2250 youth (grades 4 – 12) in a total of 77 hours of instruction in a variety of environment and natural resource topics, including watershed structure and function, water quality measures, field study activities and personal stewardship. In addition, eleven adult training programs involving 350 educators in a total of 50 hours of instruction were conducted. Topics included general watershed and environmental education, electronic probe ware, water quality monitoring, field study activities and curriculum resources. Random pre/post student testing indicated a 40% – 77% increase in knowledge and understanding of topics presented. Student statements include: *I learned more in two days than I have in a week. The program was funny and exciting along with useful information with it. I knew nothing about aquatics when I entered the room - When leaving I knew a great deal.* Random attitude surveys indicated a 4.2/10 point shift in environmental issue awareness related to watershed protection and personal behavior impacts on water quality. Adult evaluation statements included, *Keeps student interest, SOL appropriate, fun for students, active involvement in learning. Terrific! The kids will enjoy the hands-on activities and the visuals will aid in the understanding of abstract concepts! It will help my Biology II students know aquatic macro-invertebrates. I will use it in Envirothon coaching and Biology.* Programs were rated an average of 4.2/5 and many participants requested more in-depth training.

Farm Pond Water Quality. Through collaboration with county extension agents, Virginia State University extension faculty continued to offer educational programs in water quality for farm pond owners in Virginia. A series of workshops were conducted for 100+ farm pond owners in Southside Virginia. The workshops focused on pond management for recreation, fun and profit. Water from the farmers' ponds was tested as part of the workshops and follow up visits were conducted 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. Many site visits were conducted to analyze farm ponds for recreational and aquaculture uses. The water quality program resulted in significant improvements in participants' knowledge and skills in farm pond management.

Aquatic Weed Control. Hydrilla and other invasive aquatic weeds have become established in some water bodies in Virginia. Educational programs have been conducted by Virginia State

University to prevent the further spread of the plants. Educational program include plant identification training and the promotion of environmentally sound integrated control methods. An emphasis is placed on biological control of the invasive plant species using aquacultural produced triploid grass carp. Increased purchases of grass carp has been made by homeowner groups with aquatic weed infested impoundments.

Nutrient Composition Assessment and Management of Poultry Litter. 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. A new project VSU/ARS 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. This three year project concluded in 2004. It was found that poultry litter when used as recommended will benefit agricultural crops with low impact on the environment. Use of phosphorus absorbing chemicals - alum, lime, and iron sulfate - are recommended for agricultural soils when poultry litter is used as supplemental fertilizer. These agriculture friendly chemicals will precipitate out excess P in poultry litter preventing it from being removed from agricultural land runoff. These science based results can be used as best management practices to prevent eutrophication of receiving streams, lakes and reservoirs. Research findings from this study are being developed into BMPs to educate and distributed to poultry producers in Virginia, regionally and nationally.

Removal of Atrazine and Metolachlor from Runoff by Live and Decaying Switchgrass. Atrazine and metolachlor are two of the most widely used herbicides in Virginia and throughout the U.S. About three fourths of field corn and sorghum are treated with atrazine annually for weed control, which accounts for most of the 75 to 85 million pounds used per year. Fractions of both atrazine and metolachlor migrate out of treated agricultural fields every year via runoff. Such entry of atrazine and metolachlor into water systems is a concern because of their potential effect on human health and nontarget aquatic organisms. An approach used by VSU in a previous study to the water quality problem was the development of in-field and edge-of-field BMPs to abate the movement of herbicides off-site using vegetative filter strips (VFS). This study showed that switchgrass filter strips reduced the mess of dissolved atrazine and metolachlor by 52% and 59% from the applied run-on, respectively. The second objective of the VSU study, "Removal of Atrazine and Metolachlor from Runoff by Live and Decaying Switchgrass" was to determine the kinetics of atrazine and metolachlor sorption to switchgrass residue was completed in FY2004. Laboratory and greenhouse experiments were conducted to quantify the amounts of obtrusion and metolachlor that can be absorbed and removed from runoff by dry or fresh switchgrass residue. Under field conditions, it was show that fresh or dry switchgrass can help abate atrazine and metolachlor by slowing runoff flow which in turn

enhances infiltration and interception of the herbicides. This fresh or dry switchgrass residue can contribute to the protection of surface water from agricultural chemicals in runoff. Findings from these studies are being developed into a BMPs package for distribution to farmers through extension. A total of three refereed journals on this research have been published in the Journal of Weed Science and six presentations have been made on their findings at Annual Meetings of the Weed Science Society of Americans. Numerous presentations on findings were also presented at three VSU annual agricultural 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	37.86	0.0	0.0	1.5	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

Highlights of Virginia State's and Virginia Tech's 2004 accomplishments in enhancing economic opportunities and the quality of life among families and communities are documented in this report. 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 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, safe use of pesticides, forestry and wildlife, commercial and consumer horticulture and farm business management, to soil and water conservation, land and water quality. For the year, 2,356,009 contacts were made for the ANR program. A total of 186,042 extended learners were involved in this program area, and 6,289 volunteers who contributed 202,290 hours of volunteer time. The value of this contribution, based on Virginia figures @ $17.79 per hour* totaled $3,598,739 or 449,842 days 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, 1,113,934 contacts were made. A total of 58,466 extended learners were involved and 4,500 volunteers assisted with FCS, contributing 71,384 hours of volunteer time. Based on Virginia figures*, the value of this contribution totaled $1,269,921 or 158,740 days of volunteer time!

During the reporting year, Virginia 4-H programs enrolled 199,386 as 4-H members. Through a vast number of volunteers numbering 21,080, 4-H program efforts were supported and sustained. Commitment of these 4-H volunteers resulted in over 507,630 hours of volunteer time. This value of contribution, based on Virginia figures,* totaled $9,030,737 or 1,128,842 days of volunteer time! Educational 4-H programs were delivered in context of 10 broad subject matter areas. A total of 1,361,361 contacts were made during the year for the 4-H program.

Thus, the three major program areas of ANR, FCS, and 4-H involved a combined total of 331,235 extended learners and 31,869 volunteers. The total number of volunteer hours contributed to these programs was 728,304 at a value of $12,956,528, based on Virginia figures,* or 1,619,566 days of volunteer time! A total of 4,878,835 contacts were made for the year. These participants were reached 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 $11,161,497 external dollars were provided for the three program areas.

Indeed, the 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, was enhanced by programming efforts, accomplishments, and research provided by Virginia Cooperative Extension, representing both Virginia Tech and Virginia State universities.

*According to the Economic Information Services Division of the Virginia Employment Commission, July 2004-June 2005, the value of an adult volunteer's time per hour is $17.79.

Key Themes

Aging

Income Tax Assistance. Volunteer income tax assistance (VITA and TCE) for elderly clients successfully involved 252 adults, assisted by five volunteers at two Extension office sites in Madison and Orange counties. Approximately 90% of the returns were filed electronically and at a modest savings of $50.00 per return, representing a savings to taxpayers of $12,600.

Adult Financial Education. Adult financial education programs range in complexity, but common threads running through most programs include setting goals, developing a budget, managing credit, protecting their financial identity, and teaching about money. 396 individuals

participated in financial management programs involving six volunteers, representing 40 volunteer hours. 92% of survey respondents indicated that as a result of the financial education they received, they are tracking their expenses and have an established written spending plan. Participant evaluation comment: This was the first time in months that I had money left in my checking account. I felt good because I had money to run me until I got paid.

Character/Ethics Education

CHARACTER COUNTS! To date, the State 4-H Office staff has trained over 400 adults to lead the 4-H/CHARACTER COUNTS! framework throughout the state. Through the programming efforts of trained 4-H agents, volunteers, and state 4-H specialists, 4-H has facilitated CHARACTER COUNTS! programs in counties and cities throughout the state. Now, over 55 of the 130 public school systems throughout the state are involved with 4-H/CHARACTER COUNTS! programming. Approximately 1/3 of our current 4-H agents, program assistants, and 4-H educational center staff are prepared to help others with the 4-H/CC! framework efforts and over 400 adult volunteers have been trained to lead this programming effort. During the reporting year, CHARACTER COUNTS! represents the largest 4-H curriculum enrollment in Virginia with 88,105 youth. When a composite score was calculated for each of the six pillars, statistically significant differences at the .05 level were found from pre to post measurement for all six pillars.

Under the leadership of a 4-H agent working with two counties, 1,867 youth (grades 1-10) and 423 youth (grades K-5) received CHARACTER COUNTS! program learning through in-school 4-H programs. Of these, 225 fifth graders received addition activities because of behavioral concerns. One 5th grade class received a special Character Counts award from the Physical Education teacher for their assistance and positive attitude towards the special education students in the adaptive PE class. Overall, teachers reported improved classroom behavior—especially in the elementary grades with fewer referrals (60%) for In School Suspension (ISS).

One 4-H agent hosted two people from Brazil to discuss CHARACTER COUNTS! and visit a school to talk with the principal and teachers and visit classrooms. The principal credited increased SOL scores to teachers using CHARACTER COUNTS! in reading and writing at school. Students describe characters in reading and writing based on the pillars which helps them remember more details. Their thinking skills have improved and they now are utilizing more in-depth thinking.

Child Care/Dependent Care

Healthy Eating Habits. Nineteen (95% of 20) child care providers gained knowledge and skills of how to help establish healthy eating habits and improve physical activity for 255 preschool and elementary school age children in their care, thus helping reduce or prevent overweight and obesity for 30% of children and youth.

Potpourri for Providers. Of the approximate 70 child care centers and 40 licensed family day home providers in Planning District 11, Virginia Cooperative Extension conducted educational training sessions, Potpourri for Providers. A total of 224 child care providers who care for

approximately 3545 children in 7 localities in Central Virginia participated in the training. Training workshop topics included ideas for incorporating math into daily activities, supporting infant and toddler learning, recognizing signs of abuse and neglect, behavior management strategies, and incorporating media into the childhood setting. Pre and post knowledge surveys demonstrated that providers increased their knowledge significantly in the various workshop topics (up to a 36% point increase). The extension agent coordinated the efforts of 23 volunteers and collaborators who contributed a total of 194 hours to help plan, implement, and evaluate the Potpourri training sessions.

Child Care. Research is well documented to suggest a link between high quality early childhood care and education programs and children's development physically, cognitively, socially, and emotionally. Research also links the educational and professional skill level of child care providers to improved quality of care for children. Virginia State University offered a series of workshop/training sessions to 127 child care providers in topics ranging from child development to what children need to know to start school. The sessions were held during the evenings and on Saturdays to meet the needs of the clients. Participants included family home providers, center care providers, and child care center directors and owners. The needs of the providers (clients) are primary and ongoing considerations in the development and implementation of the child care training programs. Needs are determined directly from the clients through surveys and feedback on evaluation forms. A variety of teaching strategies, resources/materials, attention to learner needs, and interactive and small group activities are components of the training sessions. Topic area content included understanding normal child development, improving and using observation skills, positive discipline of young children, fighting obesity and diabetes and keeping children healthy, the art and science of play with young children, dealing with anger in children and adults, operating a successful center, and the child care center accreditation process. Evaluation items were targeted toward obtaining information on new learning obtained, new ideas and practices learned, and how the participants plan to use the information, ideas, and practices in the child care program. 92% of the participants reported that they had obtained new information/learning; 89% reported that they would make practice changes as a result of the new ideas, information, demonstrations etc. presented during the sessions; 72% reported specific plans or ways that they planned to institute changes in the child care setting/program. Comments such as " I plan to re-word expectations by giving clearer and simpler instructions saying what I want children to do rather than what I don't want done"; "I will try to use innovative and alternate tactics when dealing with children that display abnormal behaviors and document the behaviors more consistently"; "I will stop pressing children to eat their food and use some of the other strategies I learned today"; "Not use time-out so much but try to redirect their anger, and discussing the problem with the group"; "Stop using no so much and talk and use "Refrain from using a loud voice for discipline and reward and recognize children for good behavior". Other comments related to developing and improving center operating manuals, revising and rewriting policies and job descriptions of staff.

Amherst County Extension was the recipient of an $11,000 grant from the Department of Social Services to enhance the quality of child care in the county. The FCS extension agent conducted subject matter training in four areas and provided participants with materials and resources that support the training topic. Four training sessions were conducted for 87 Amherst County child care providers on the topics of '5 A Day', 'Get Moving', 'Awesome Art', and 'Fostering

Children's Social Competence'. A total of 8.5 hours of training was offered and 35 materials kits designed to support the training topics were distributed to the centers and family day homes who participated. Pre and post knowledge surveys indicated that the providers increased their knowledge in each of the topics: '5 A Day' pre average = 35.5 % correct, post average = 74.5% correct; 'Get Moving' pre average = 53% correct, post average = 80% correct, 'Awesome Art'_ participants ranked knowledge gain of 3.8 on a scale of 1 to 4; 'Fostering Children's Social Competence' pre average = 68%, post average = 93%. In addition to increasing providers' knowledge, follow-up surveys were conducted with three of the four trainings to determine the rate of implementation and usefulness of the materials in supporting children's early learning.

Children, Youth and Families at Risk

Career Counseling. In cooperation with Virginia State University's school of Agriculture and its Rural Entrepreneurship program, Halifax High School at risk students and 4-H youth have benefited from the resources provided by a career counseling program. Ninety-four percent (33 of 35) of the youth involved in the program indicated on and pre-post survey that they had chosen a career path and were aware of the education needed for their respective field of choice.

Nutrition/Health/Physical Fitness. Washington County School Board established a Nutrition, Health, and Physical Fitness Task Force in early August of 2003 to address the issues of obesity, lack of fitness and poor nutrition of Washington County students. In an effort to combat the issues of poor nutrition and increased sedentary lifestyle of local children, 4-H and local schools teamed up to provide educational support at Meadowview Elementary, a school identified as having a high rate of obesity issues and 49% of students at or near poverty level. An in-school 4-H nutrition program was piloted there with curriculum developed and gathered from USDA materials, VCE publications, and 4-H EFNEP programs. Components of the program included: exercise, healthy snacks, portion size, and food pyramid. Each class received six hours of nutrition education. Evaluation of the program was based on worksheet results and pre/post tests. After completing the program 100% of students from every grade level could identify and make healthy snacks and student awareness of eating habits and exercise has improved. Principals and educators at all four middle school incorporated the curriculum as an addendum to their schedule each week. Positive results have been reported from pre/post test outcomes. Student awareness of their eating and exercise has improved. (The Meadowview Elementary Enrollment is 606.)

Horticulture Job Skills. Thirty-six juvenile offenders housed in the W. W. Moore Juvenile Detention facility in Danville completed a nine week course in Horticulture Job Skills, conducted by Cooperative Extension staff. The course was designed to teach marketable job skills and job hunting skills to provide an alternative source of employment to the juveniles. The completion rate for the course was 100% with 25% securing employment with Green Industry businesses in the area. One participant, when told he was "up for early release" asked the judge if he could stay an additional 2 weeks so he could complete the program.

Communication Skills

School Enrichment Programs. Through School Enrichment Programs in the Albemarle-Charlottesville area, 568 young people in 3rd-5th grade were provided programming on how to

organize and present a speech. This 4-H Public Speaking and Presentation Program enrollment grew 15% over the previous year with a 100% return rate from the previous year's participating schools. After listening to 3rd grade speeches, one parent remarked that these young people were using skills that she didn't learn until she was in college preparing for law school.

Public Speaking. A total of 973 Scott County 4-H'ers participated in their club public speaking events. As a result of 4-H programming, 50% have improved their skills in collecting and organizing information, while 60% learned to develop communications skills by understanding the principles of public speaking through the delivery of a speech on a chosen topic. Parents who attended the county contest thought this was a wonderful opportunity for the youth and they couldn't believe the quality of the speeches. Several teachers stated, "This is a life skill and we want to thank the 4-H Program for taking the leadership and providing this learning experience and at the same time covering several Standards of Learning (SOL'S)."

Presentation Workshops. 418 youth (grades 4-7) in Russell County participated in the 4-H Presentation Workshops and prepared and delivered presentations, of which 99% returned completed evaluations—71% stated that their self-confidence was increased by participating in the 4-H project, while 76% stated their skills in standing before a group and presenting their ideas had improved and it was easier for them to organize information in step-by-step sequence; 80% stated their listening skills had improved and 87% indicated they had learned new skills from listening to the other presenters; 83% percent stated that, having participated in this project, it will be easier for them to prepare and give a presentation, speech, or dramatic reading in the future.

Family Resource Management

Money Management. 178 families (37% of 482) participating in Managing Your Money workshops and home study courses, conducted by Virginia Cooperative Extension, reported increased control over their finances; 137 (28%) stated they would make practice changes such as tracking expenses and balancing their checkbook.

Evaluations from a basic money management workshop indicated that of the fourteen participants 11 (78%) will start writing financial goals, all will keep track of future spending, 9 (64%) did not balance their checkbook, but after the workshop 11 (78%) will start balancing their checkbook.

The Fluvanna Correctional Center for women anticipates that they release 600 women annually. Pre release transition education is needed to improve the rate of successful transition. Improved financial literacy and development of skills leading to positive change in money management behavior can result in a reduced rate of recidivism. 128 women received six hours of financial education from Virginia Cooperative Extension. Post program reports indicate that 78% have acquired new information which will enable them to improve their money management skills upon release

Agricultural Financial Management

Assistance for Underserved Agricultural Producers. 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 to conduct training and provide educational materials in risk management tools for agribusiness professionals with the responsibility for providing outreach and assistance to under-served agricultural producers. Funded by a grant from USDA-Risk Management agency, the training sought to equip educators with the skills needed 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. During 2003-2004, seven workshops were implemented. Workshops were held in Petersburg, Virginia; Baton Rouge, Louisiana; and Albuquerque, New Mexico and in Atlanta, Georgia for 178 participants from than 22 states plus Puerto Rico and the Virgin Islands. The participants represented seventeen 1890 Universities; one 1994 University; four 1862 Universities; eleven community 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. Each workshop was 2-3 days long. Participants received training materials including, crop insurance handbook, FINPACK training manual, FINPACK software, FINPACK Business Plan software, and FSA Forms software along with case studies of representative small farms. The feedback and evaluations from the 178 participants suggested the following average percentage improvements in their abilities as a result of the workshops:

- Ability to provide financial planning assistance to limited resource producers – 81%;
- Ability to use FINPACK software to provide financial planning assistance to limited resource producers – 84%;
- Ability to help limited resource producers understand and use crop insurance – 75%
- Ability to develop and evaluate alternative farm plans for producers – 83%
- Ability to help producers develop loan request documents – 82%

Small Farm Technical Assistance. Virginia State University Cooperative Extension specialists and agriculture management agents conducted the small farm technical assistance and outreach program in 42 Southside and Southwest Virginia counties. Participants received information, training and technical assistance in agricultural production, record keeping and analysis, loan application packaging, business management, marketing, financial management, agricultural risk management and USDA farm programs for small, limited resource and socially disadvantaged producers in the targeted counties. Direct contacts were made with 6000+ individuals through farm visits, conferences, workshops, group meetings, farm demonstrations, field days, phone calls, direct mails and other methods during the year. As a result of the program, four small farmers received approval for loan applications totaling $315,000 from Farm Service Agency. 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.

Plastic Recycling. Through a cooperative effort between Virginia Cooperative Extension and Virginia Department of Agricultural Service an environmental protective program, the Plastic Pesticide Container Recycling program has successfully recycled an average of 2,000 containers per year (22,000 containers in total). A combination of volunteers (50 total volunteers) time and landfill space savings amounts to $7,000 in savings to the local county.

Timber Sales. Following a "How to sell your Timber" program in Louisa County, conducted by VCE, 100% of the survey respondents (n = 32), representing over 6000 acres, indicated that as a result of this program they were better able to earn fair market value for their timber and guard against timber theft/trespass. This program was specifically targeted to African-American landowners, which made up 22% of the participants.

Following a "Woodland Options for Landowners" short-course in Nelson County, 2 participants went on to form the county's first Ag/Forestry District comprising 2,500 acres and involving 12 landowners ensuring lower taxes and open space preservation for continued productivity of forest resources. As a result of the same program held in Fauquier County, a landowner shared his decision to sell timber. As suggested in the short-course, the landowner sold his timber in a competitive bid process, more than doubling his revenue from $20,000 (low bid) to $50,000 (high bid).

Home Safety

Air Quality. Ten child care providers participating in Indoor Air Quality and Asthma programming conducted by Virginia Cooperative Extension completed a pre and post test. Post test results reflected a 20% increase in correct responses of participants which indicates an increase in their knowledge.

Radon. Virginia Cooperative Extension programming focused on ‘Radon: What You Should Know,’ involved 23 people with information about the health risks of radon gas in the home, the implications for buying or selling a home, how to test for radon, and the basics of remediation. Eight of the participants completed the end-of-session evaluation. Of these, all eight (100%) indicated that they have a better understanding of the topic. All eight (100%) also indicated that they plan to make at least one of the four practice changes listed on the evaluation. Practice changes included testing the home, making changes to reduce the levels of radon, contacting a recommended resource for more information, and including plans for radon testing/reduction when building, buying, or selling a home.

Home Ownership. Thirty-one low-to-moderate income families served by Richmond Redevelopment and Housing Authority completed a series of Extension's Homeownership Educational classes to prepare them for homeownership. 100% of the recipients improved their chances of qualifying to become first time homebuyers and increased their understanding of good money management practices by reducing debt and saving.

Shelter is a basic human necessity. To own a home is the American Dream. However, many people are unaware of where to begin this odyssey or what to expect along the way. Then, after purchasing a home, many are not knowledgeable about cost effective ways to maintain them. For the past 13 years, Cooperative Extension at Virginia State University has been conducting an annual housing conference for potential and existing homeowners. Topics covered include credit, budgets, legal issues, reverse and second mortgages, foreclosure and home inspections. In conjunction with the Virginia Housing Development Authority, Virginia Cooperative Extension has also continued to offer a series of six-hour homeownership classes for people seeking information on purchasing homes. In addition to the topics mentioned above, participants learn about loan closing and the roles of realtors and lenders. In 2004, as a direct result of Cooperative Extension's efforts, 61 home education participants purchased homes. Certificates issued for completing home education programs helped participants secure loans from lenders totaling approximately $5.4 million. Twelve educational workshops on Home Maintenance and Repair were provided to approximately 120 consumers, which resulted in a net saving of nearly $6,000. One Hundred Fifty people attended the 2004 Southside Virginia Housing Conference. Seventy-nine percent were first time conference attendees. Conference evaluations showed that 91% of attendees would start a home improvement repair project. Two attendees purchased homes

Jobs/Employment

Appalachian Legacy. Through a collaborative effort of the Dickenson County FCS extension agent and Director of Heart of Appalachia Tourism Authority, a $50,000 grant was received from the VA Tobacco Commission under Agri-business to assist five Appalachian Legacy food product entrepreneurs to sell in the Smithsonian Folklife Festival and be a part of the VDACS Virginia Food and Beverage wholesale show with a total of $12,000 sales, therefore jump-starting their businesses.

Wine Grapes. Identifying potential alternatives and supplemental enterprises in today's agriculture environment continues to be a challenge. This past year, I continued to head an effort in working with nine individuals, four of which are tobacco producers, in looking at wine grapes as a potential opportunity on their farm. Working with the Winchester AREC in arranging on-site visits and this year we conducted three vineyard tours/workshops with these interested producers. As a result of these efforts, three of these producers have established a vineyard and one more will be planting this spring. The potential return per acre for this enterprise is well over $2000 per acre when in full production. At this point in time, we now have five vineyards established and one being planted in Charlotte County that will bring around 40 acres into grape production. These producers have an average of $6,000 per acre invested in these vineyards for a total of over $240,000 that has found its way into our economy. These vineyards also have the potential of generating $1,500 to $3,000 per acre when production starts which will generate over $100,000 per year into the agriculture economy, and employing several workers.

Workforce Preparation. Virginia State University's Cooperative Extension conducted the Rural Business Development and Entrepreneurship Program in 2004. The purpose of the program was to teach adult and youth residents in six rural counties in south central Virginia to write small business plans, manage small businesses, and obtain financial resources for written business plans. The purpose of the youth component of the project was to provide exposure to

career development and entrepreneurship opportunities, provide educational and technical assistance to develop a business plan, and to assist youth entrepreneurs in acquiring management skills that would assist them in starting, owning and operating a business. The counties that participated in the project were: Nottoway, Lunenburg, Prince Edward, Sussex, Brunswick, and Halifax. The 4-H Youth Development Specialist delivered the youth component of the educational program. Two-hundred twenty-one youth received training. Fifty-one youth who attended the training completed written business plans. To date, approximately 7 youth who attended the rural entrepreneurship training are planning to obtain funding for their business ideas and will use the written business plans to do so. One graduate of the program has already started a viable web-based business providing services to individuals in selling their goods on eBay.

Farmer's Market. Virginia Cooperative Extension assisted the Northern Neck Vegetable Growers' Association with the organization and management of programs supporting the Northern Neck of Virginia Farmers' Market which for the year 2004 sold in wholesale value $10,320,947.00 of produce. Several jobs were created for Northern Neck residents which contributed to the local economy.

Parenting

Parenting Skills. The prevalence of adolescent and youth risk factors is a costly matter for families and communities, in addition to the negative impacts such behaviors have on establishing and maintaining effective family relationships and school success for youth. Parents need information and education to enhance their skill to support their children's emotional, social, and academic success. Parents also need information and resources to assist them to better make informed decisions, support and advocate for the needs of their children. Virginia State University responded to several requests for information and assistance from parents whose children were experiencing behavioral and/or academic/school problems. Fifteen parent education sessions (consultations and training) were held to assist parents with issues such as positive management of children, understanding child development, understanding the special education process, understanding the rights of special needs children, accessing community resources, managing school problems, school adjustment, dealing with crisis situations with children, making appropriate interventions in the home and school environment to assist children. The sessions included education materials, videos, home interventions, behavioral management contracts, and referrals to appropriate community agencies and professionals. Training resources included Positive Discipline curriculum, National Network for Child Care, CYFERNET, and specialist publications. 100% of the parent participants reported a progressive and positive change in the child in the home and school environment (from school reports and parent conferences). 100% of the participants reported using one or more of the suggested interventions, a feeling of empowerment and awareness about how to handle the problem and where to seek assistance. Other improvements were reported in relationships with school personnel, understanding the rights of special needs children, and greater confidence to advocate (ask questions, seek resources, referrals, etc) for their child.

Positive Parenting Program. The Petersburg Cooperative Extension Family and Community Sciences program reinstated the Positive Parenting Program and Teen Parenting Program. These

programs aid District 19 residents and meet the demands of the Department of Social Services and Court Services. These agencies need assistance in providing Parent Education for parents cited by these agencies for child neglect, abuse and non-divorce custody issues. There were 32 participants. As indicated by the evaluations, 95% of the participants (30 of 32) indicated an increase in parenting knowledge and skills, as well as an increase in confidence and reduction in stress when dealing with parenting issues.

Living Apart, Parenting Together. This program was offered monthly during the year by VCE. A total of 167 parents/guardians in PD9 completed the four hours of instruction that addresses issues facing families involved in separation and/or divorce. Another 24 completed the class in Louisa during October and November 2003. Completion of the class meets one of the requirements of the courts by parents/guardians facing custody issues. 87% (175) of the participants reported the class assisted them in understanding how to reduce parental conflict. 93% (186) reported an increased awareness of the effect of separation and conflict on their children. 90% (180) reported they learned skills on how to keep children out of the middle of parental conflict. 89% (177) reported an increased understanding of why children need and want a healthy and meaningful relationship with both parents. It is rewarding to see the change in attitude that occurs with approximately 90% of the participants. “Thank You! After 28 years as a parent I learned that I still don’t know it all!” (comment of one participant).

Love and Logic. Becoming a ‘Love and Logic Parent’ course evaluations were completed by 27 participants in 2003-2004. Of these, 26 (96%) improved their parenting knowledge and 22 (81%) indicated that they feel more confident about their ability to handle behavior problems as a result of the program. In addition, 26 (96%) of the respondents made one or more improvements in the way they interact with children and 15 (56%) 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 teaching self-control, anger management, bickering, homework, procrastination, back talking, brushing teeth, bedtime, getting ready in the morning, getting children’s rooms clean, defiance, aggression, and power struggles. Volunteers contributed approximately 21 hours of time to the program ‘Love and Logic’ programs during the year.

Promoting Business Programs

Child Care. Seventy-three individuals completed the "Starting a Family Child Care Business" Program in Loudoun County. They gained knowledge of the requirements for business license, zoning permit, voluntarily registration, state licensing, and the USDA food reimbursement program of meals and snacks. 100% indicated they will become regulated (state licensed or voluntarily registered) on the post program survey and 12% have already completed the process according to state records.

455 persons (77% of 632) participating in quality child care educational workshops reported increased knowledge in the areas of business management, child development, and nutrition education. Of that number 290 (46% of 632) stated they would use information learned to improve their business practices. 77 (12% of 632) reevaluated their policies and procedure manuals to reflect their business mission & philosophy.

Reality Store. Of the 724 students participating in the VCE Reality Store experience, more than half said they understand the a relationship between their grades now and future income and more than seventy-five percent (75%) indicated that in the future they would make wiser practice choices.

Supplemental Income Strategies

Skills for Beginning Farmers. 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 generating incomes 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 especially individual consultation by phone, mail and farm visits to help provide the needed education. The First Annual Commercial Vegetable Production Field Day was held at Virginia State University in June of 2004. 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, correct stage for harvest, finding sources of supplies, etc.. A Small Farm Family Conference was held in December, 2003 at Virginia State University. 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. The Virginia Biological Farming Conference was held in January of 2004 in Wakefield, Virginia to help beginning farmers understand the marketing opportunities presented by the new National Organic Program (NOP) of USDA. A survey of participating farmers shows that: Over 120 beginning farmers developed business plans for their farming operations; many farmers established trickle irrigation systems. Sixty beginning farmers earned average net income of $6000 from marketing vegetables. Forty beginning farmers earned average net income of $8000 from marketing fresh cut flowers. Eighty 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. One hundred beginning livestock farmers earned average net income of $4000 marketing pastured poultry, organic eggs, organic beef or pastured pork. Twenty beginning farmers were approved for USDA loans. Twenty beginning farmers participated, for the first time, in USDA conservation cost-share programs.

During a time of depressed milk mailbox prices, agri-tourism events at an area dairy farm netted the farm over $165 per hour using produce that was usually wasted. The farm owner credits this Extension program with keeping his dairy operational.

With continued business and marketing assistance from FCS agent and Appalachian Legacy program through Heart of Appalachia Tourism Authority, 100% of the food product businesses

trained under the extension led 40 hour educational program (5) are still in business and producing 24 food products under that label with more than $16,000 of sales.

Fourteen (14) Individual Development Account participants completing a 'Financial Fundamentals' educational program conducted by Virginia Cooperative Extension, developed money management skills that resulted in saving $6,954.

Youth Development/4-H

Youth Development Seminar. Virginia State University's Cooperative Extension/4-H Youth Development Program conducted the third annual Youth Development Seminar at Virginia State University. The seminar was entitled "Making Your Way in the World" and addressed bullying, youth violence, team building, and collaborative tasking. The purpose of the seminar was to assist youth in addressing specific social issues that affect their daily lives, provide them with tools to do so, and to provide personal development training that focuses on anti-bullying strategies, character education, and team building. Sixty-one participating youth were given the opportunity to view a 1 ½ hour movie entitled, "Bang, Bang, You're Dead," where they were introduced to the harsh realities of bullying and its effect on their lives and their peers. Through small group sessions and role playing, session leaders and youth openly discussed personal bullying issues that affected them on a daily basis. Using role play scenarios, session leaders and youth identified mechanisms for dealing with issues that face them and developed techniques for addressing those issues. Youth also participated in a team building and cooperative tasking session that involved youth in a variety of small and large group challenges and activities that encouraged cooperation, trust, team-work, idea sharing and self esteem building. Activities required physical and mental concentration and coordination, starting with individual challenges, then small team and finally whole group interaction. 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 bullying session helped them identify techniques for dealing with issues of bullying that they sometimes encounter.

Bullying Seminars. Virginia State University's Cooperative Extension/4-H Youth Development Program conducted 18 youth bullying seminars throughout the state of Virginia to address issues of bullying and relational aggression. Anti-bullying programs were delivered to approximately 275 4-H teen and college level camp staff, 81 child care providers, 48 statewide camp directors, 118 4-H and non-4-H middle-school aged youth. The seminars objectives include: a) Defining bullying, determining why individuals bully, and reviewing the common forms of bullying; b) Identifying how female bullying differs from male bullying; c) Defining relational aggression and the reasons it is so damaging to females; d) Determining effective methods to address bullying within a camping environment; e) Discussing techniques and interventions adults can use to identify and stop bullying; f) Using role play scenarios to resolve conflicts that youth face when dealing with one another. The bullying seminars lead to bullying strategies being implemented during summer camp programs at 5 4-H Educational Centers in the state of Virginia. Programs were also implemented at 3 non-4-H summer camp programs in Virginia. Program evaluation data, indicated that youth, as well as adults working with those youth, learned strategies to deal with bullying that they were not previously knowledgeable of. Ultimately this helped them feel more comfortable in dealing with bullying issues.

Day Camping. During the reporting year, 24,050 youth participated in residential and day 4-H camping programs. The summer program focused on 5-day residential camping programs that involved 10,799 youth and 1,681 volunteers. A total of 1061 parent/guardian surveys were distributed with a 31% response rate. When a composite score was calculated for each of the six aspects of respective child's 4-H camp experience and life skills gained, there were statistically significant differences at the .05 level found from pre to post measurement for in all areas. The same was true for campers' evaluations. The camp counselors contributed 132 hours of volunteer time each with a total of 221,892 hours of time to prepare and conduct 4-H camping programs throughout the state. This equates to 27,737 days of volunteer time with a contribution value of $3,887,649.

School Programs. Teachers of students in every school program in the county stated that every student who participated in our programs on 4-H Plants and Soil Science, and participated in our local and district contests, passed the science portion of their Standard of Learning (SOL) test.

Through a collaborative effort with the local YMCA, three after school 4-H special interest groups have been established at three of the elementary schools in the city. Within these three after school programs there are approximately 75 youth. The focus is on the Healthy Weights for Healthy Kids program with these youth. To date, more than 70% of the youth have stated that they learned what the correct amount of servings for the different food groups are; 40% said they learned about major health risk that are caused by eating too much sweets, oils and fats.

Enrollment. The number of 4-H members enrolled in our state grew from 191,645 to 199,386. Additionally, the number of 4-H volunteers grew from 15,632 to 17,398. The number of 4-H members increased by 4% when compared to the last reporting cycle, and the number of 4-H volunteers increased by a little over 11%.

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	96.11	7.0	0.0	5.88	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

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 (ELC's). 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, Agriculture and Nature Resources, and Community Viability), 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. The average number of active members is 18, thereby representing a total of 1,944 ELC representatives involved in the programming efforts of VCE. They meet at least four times a year, indicating that consistent contact is occurring to achieve grassroots involvement.
During this reporting cycle, 20 training workshops were conducted in multiple locations across the state involving 621 ELC members and faculty for 1905 contact hours. Topics covered included ELC roles and responsibilities, planning and conducting situation analysis, conducting

focus group and key informant interviews, and developing facilitation skills. Each local ELC conducted a comprehensive unit situation analysis during 2004. The resulting comprehensive stakeholder input will be valuable in shaping the direction of Extension programming at the local level, district, and state levels. Programming committees made up of agents, specialists, and administrators met for two days to review all issues identified in the situation analysis process and to assign key words to each issue. Further, a computer program was developed to allow stakeholders, specialists, agents, and program administrators to search issues at the local, planning district, district, and state levels by location and/or topic area. Lastly, the Agriculture and Applied Economics Department conducted a study of the data provided in unit profiles. This information will be helpful in understanding the community perspectives collected in the situation analysis process. During the present year, program planning teams will develop strategies to address local needs identified in the comprehensive situation analysis.

The VCELC met four 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 ELC's, which they represent. In addition, planning district representatives provided communication to local ELC's 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.

During the reporting cycle, the VCELC gave leadership to conducting seven homeland security listening sessions throughout the state. The sessions gathered community perspectives on this topic which is being used to direct VCE programming efforts.

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. 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 the programming process to extent possible.

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.

In addition, during this reporting cycle the Dean with assistance from the College Leadership Council conducted four listening sessions around the state. Community leaders such as the board of directors of the Virginia Agribusiness Council, the Virginia Young Farmers were engaged in discussion concerning the direction of VCE and research programming as well as the teaching mission of the college. The resulting information has been used in strategic planning for the college and to ensure that program offerings are relevant to key stakeholders.

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 Richmond. Major emphasis this year was the recruitment and orientation of new members resulting in a broader representation of stakeholders including local government officials and representatives of key state and community partners. The Leadership Council is organized in subcommittees that are addressing program funding issues and the development of a marketing plan.

4-H Leadership Council

The Virginia 4-H Leadership Council, consisting of 34 members, was created in 1994. The council 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 four times. The Council is divided into three active working groups: Policy, Emerging Issues, and Marketing, and has been active in all three areas. 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 quarterly or monthly 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. In addition, most local boards now have representation on the local Extension Leadership Council and thus facilitate communication between the two groups.

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. 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 program sub-committees including forestry, fisheries, wildlife, forest products, and natural resources recreation. Sub-Committee work was conducted throughout the year both in formal and in informal meetings.

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. During the annual meeting programming progress was evaluated and the council made recommendations for program improvement for the programming year.

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 2004, 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 58+ 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 (Virginia Tech)
State Virginia

Check One:
X Multistate Extension Activities
_____ Integrated Activities (Hatch Act Funds)
_____ Integrated Activities (Smith-Lever Funds)

Title of Planned Program Activity	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
1) To achieve agricultural production system that is highly competitive in the global economy.	$296,000	$330,000	$450,000	$500,000	$441,800
2) To provide a safe and secure food and fiber system	14,000	26,000	85,000	12,000	52,900
3) To achieve a healthier, more well-nourished population.	14,000		5,000	5,000	5,600
4) To achieve greater harmony (balance) between agriculture production(production activities) and (stewardship and protection of) the environment.	149,000	155,000	144,000	115,000	99,500
5) To enhance economic opportunities and the quality of life among families and communities.	9,000	10,000	15,000	67,000	123,600
Total	$482,000	$521,000	$699,000	$699,000	$723,400

Patricia Sobrero — **Director**
5/2/2005 — **Date**

Form CSREES-REPT (2/00)

Note: 10% target of $689,214 was met in FY 2004

Brief Summaries of Multistate Extension Activities

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

Virginia Ag Pest Advisory

In July 2004 we launched the Virginia Ag Pest Advisory (http://www.sripmc.org/virginia/) in cooperation with the Southern Region IPM Center in Raleigh, NC. The advisory is a database-driven website that compiles pest updates from multiple IPM specialists. Specialists enter their update(s) at a time that is convenient and each entry is categorized by commodity and pest group. The compiled advisory is automatically emailed once a week to the recipient list. Individual entries can be viewed, or the entire newsletter. The advantage of this system to the recipient is that it is a single-source provider of updated pest information—everything is in one location and users become accustomed to having it delivered at the same time each week. Use and benefit of this activity, by its nature (email and internet delivery) is limited to those able to access the information. However, more and more under-served and/or under-represented clientele are accessing electronically delivered materials-and several are represented in the almost 350 current Advisory recipients. In order to assess the usefulness and impact of the Virginia Ag Pest Advisory, we conducted an on-line survey of all 346 email recipients at the end of the field-season in 2004. There were a total of nine survey questions concerning the advisory (five multiple choice and four short answer) concerning usage statistics, usefulness of the information and how it affected IPM practices, and suggestions for improvement. There were 119 responses to our survey (34.4% response rate). A vast majority of the respondents found the advisory to be useful; on a Likert scale of 1 (not useful) to 5 (very useful), the mean was 4.0. In addition, most respondents reported that the advisory influenced their (or their clients') pest management practices; on a Likert scale of 1 = did not influence and 5 = greatly influenced, the mean response was 3.3. Based on responses to a list of other questions in the survey, the Virginia Ag Pest Advisory clearly had a strong impact on educating clientele on agricultural pest problems and pesticide use. For instance, a couple of additional comments by respondents included: "[the advisory was] excellent for alerting farmers of possible insect problems" and "I became aware of pests we do not usually have." The Virginia Ag Pest Advisory is an extremely useful information dissemination tool that simplifies the process of collecting input from IPM specialists and distributing the information in a timely manner. Growers, Cooperative Extension agents, agricultural industry personnel, and others will benefit from the advisory's rapid dissemination of information, it's "anytime, anyplace" availability, and knowing that the information is reliable because it comes directly from specialists. We hope to expand, enhance, and optimize the use of the advisory to support our clientele and to promote on-line surveys for improving Extension programs and reporting impact data to Extension administrators.

Development of Multistate Weed Control Recommendations for Agronomic Crops

Hosted by VT weed scientists, peers from Maryland, Delaware, New Jersey, Pennsylvania, and West Virginia meet annually to update weed control recommendations for corn, soybeans, small grains, sorghum, pastures, and forages. The resulting recommendations form the basis of both the weed control sections of the VT Pest Management Guide and the equivalent publication published jointly by Maryland and Delaware. The recommendations resulting from this activity are appropriate for all audiences engaged in raising the agronomic crops referenced above. The

expected outcome is to develop a set of recommendations that are economically and environmentally sustainable. Impacts are not specifically quantified by the authors within this activity, but can be accurately reflected by herbicide sales information obtained from the private sector.

Bristol Steer and Heifer Show
A livestock show including steers and heifers that is managed by agents from south west VA and East Tennessee was conducted. Virginia has always had the Chairmanship and at least greater than 50% participation in the show. The committee is comprised of agents from both states that set the rules and regulations of the show. The judge comes from Virginia Tech one year and from Tennessee the next. In connection with that a carcass show is conducted and includes helpers and participants from Tennessee. Evaluation meetings are held each year to discuss problems and direction for the show. Testimonials from Extension employees provide evidence of the impact the show had on their education and them employment.

Appalachian Area Horse Round Table
The Appalachian Area Horse Round Table is a collaborative effort between the University of Tennessee Extension Agents, Specialists, and Extension Agents from Virginia. The purpose of the Horse Round Table is to provide horse owners with precise up-to-date information on topics of current importance and interest. Topics discussed last year were feeding your horse in winter, West Nile Virus, Eastern Equine Encephalomyelitis, the economic importance of horses to the area, toxic plants and fescue, and broodmares. There is no cost to attend the program. This program had shown a tremendous response of attendees to similar events at other locations and prompted scheduling this new event for upper East Tennessee and Southwest Virginia. Due to the success of last years program, with approximately 125 attendees, a follow up round table was scheduled for January 26, 2005 with topics on Horse Hays, WNV - Where Do We Go Now, Horse Facilities in the Appalachian Area, Understanding the Horse Feed Tag, and How Biotechnology Can Impact the Performance Horse. This clientele is a growing group who has not traditionally been targeted or attended traditional Extension programs. By organizing intensive, focused educational programs directed at the equine industry, we have been successful in reaching a new clientele base. Last year, approximately 125 attendees ranging from Knoxville, TN to Tazewell, VA attended the horse round table at North East State Technical Community College. From the round table, my personal contact with individuals in the equine industry and their awareness that Extension can provide non-biased educational material has increased dramatically. This contact has prompted the creation of two additional educational opportunities in Washington County and Scott County at local events where Extension has been contacted to develop educational programming. Attendees are given a pre and post survey of current knowledge of topics discussed and information gained by attending.

Commercial Grape Production
Extension specialists in Virginia, Maryland, and Pennsylvania conducted three, one-day short courses in the represented states. These short courses 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 grape extension programs. Two workshops were presented in this reporting period, 11 October 2003 (Winchester, VA) and 18 March 2004

(Lancaster, PA). Over 160 persons attended the one-day workshops. The basic grape production programs targets the needs of new and interested producers who are entering the expanding grape and wine industry of the mid-Atlantic US. We focus on increasing the knowledge base of attendees such that they can make informed decisions about if and how they might enter grape/wine production enterprises. A one-page exit questionnaire is used to assess basic knowledge gained in the workshop. Based on this survey, we are confident that we are getting the critical information across to attendees. For example, "100% of the attendees who completed a questionnaire (n=37) at the most recent workshop indicated that they gained a general understanding of the financial inputs and returns of a well-sited vineyard. Eighty-nine percent of respondents correctly identified primary vineyard site considerations in vineyard site selection.

Vegetable and Small Fruit Production
Cooperating specialists working with vegetable crops come together once a year to make changes to the Commercial Vegetable Production Recommendations PMG (VCE pub 456-420), which all states share/publish in common (Delaware, Pennsylvania, New Jersey, Maryland, Virginia). Regional Small Fruit Production Guide. This is a new effort, to be published Spring 05. It also involves the above states and specialists. It will be a "multi-year" publication, versus being updated annually. The Good Agriculture Practices (GAP) Program is a nationwide program with over 20 states participating. Cornell and NC State have been the lead institutions with grants through the USDA Food Safety Program. Virginia Tech collaborated with both institutions and the VDACS in Virginia to deliver this program, which is focused on safe produce handling by growers/shippers. We do know how many vegetable production guides are sold annually through extension (300+-). Successful production of crops is the expected outcome with the GAP program. We have trained over 400 growers in GAP principles. To date economic impact is mostly unknown, but we do currently have two growers GAP certified in the state, who are larger apple growers selling contract product to the federal government school lunch program. Without on-farm GAP certification, these contracts would not have been possible, as the USDA required it. In the future, Walmart, Kroger and other chains may follow suit, and require grower certification of GAP compliance. This has happened in other states/brokers, and will likely happen to a greater extent in Virginia, and increase demand for GAP training program.

Southern Extension Policy Affairs Committee (SEPAC)
This is an annual meeting of southern region public policy extension specialists and annual national meeting of extension public policy educators; all designed to facilitate collaborative extension programs between states. The program of the meetings deals with critical issues such as the Farm Bill, challenges to agricultural businesses by environmental policy, rural community economic development, and more. Membership on the committee includes participation by all 1890 institutions in the region. Educational materials developed by the committee include those directed specifically towards under-served and under-represented audiences. Outcomes are continuously redefined as new multi-state programs are developed and delivered. An example is development of educational materials and delivery of educational program on the 2002 Farm Bill; awards were received for these programs from USDA/FSA and from Farm Foundation.

Virginia/Carolina Agriculture Risk Management Seminar

The Virginia/Carolina Agriculture Risk Management Seminar was held on January 12, 2004 in Franklin, VA. Participants included 277 producers (171 from Virginia and 106 from North Carolina), five peanut sheller/processors, 27 lenders, 16 extension agents, five extension specialists, 12 VDACS personnel, 16 local, state, and federal elected officials, and other community influencers. Risk management information was presented regarding peanut processing, peanut production, peanut crop budget considerations, peanut marketing alternatives regarding contract production, and peanut marketing alternatives without contracts. This information was critical in light of the termination of the Peanut Quota program and its impact on agriculture and land use issues in southeastern Virginia. Fifty percent of meeting participants were surveyed via personal or telephone interview at four different intervals post meeting event. The interval dates were one week, four weeks, six weeks, and 12 weeks post meeting. Additional follow up to participants included contact by US mail to deliver both written and computer generated seminar information. Three weeks post event, three hundred twenty-nine compact discs containing the 2004 Master Budget Calculator for crop budgets (a computer spreadsheet cost/income calculator) and seminar proceedings were mailed to clients in both Virginia and North Carolina. As a direct result of risk management activities: peanut shellers raised their contract offering from $450.00 per ton to $500.00 per ton, peanut producers increased planting intentions 5000 acres over last year, direct increase in gross economic revenue from additional peanuts was estimated at $3,750,000.00, an additional $4,625,000.00 in direct cash infusion to the regional community was generated from the extra $50.00 on the peanut contract, total economic impact of the V/C Seminar was estimated to be well over $8,375,000.00, the economic ripple effect of such an increase in gross sales of peanuts was calculated to be $16,912,000.00 in additional revenues for vendors and other stakeholders in rural southeast Virginia communities, and total economic impact was estimated to be $33,662,000.00.

Increased Efficiency of Sheep Production

Virginia State University is involved in the multi-state research project Number: NCR-190 - "Increased Efficiency of Sheep Production". Other states involved include Cornell University; University of California-Davis; Iowa State University; University of Kentucky; Michigan State University; Oregon State University; Pennsylvania State University, South Dakota State University; Texas A&M University; USDA-ARS, Dale bumpers Small Farms Research Center, AR; USDA-ARS Meat Animal Research Center, NE; USDA-ARS, U.S. Sheep Experiment Station, ID; Utah State University; Virginia Tech; and The University of Wisconsin. The annual meeting of technical committee members was hosted by University of Wisconsin in Duluth, MN, and at the Spooner Agricultural Experiment Station on June 27-29, 2004. A revised project was developed that included an objective on hair sheep and was approved for a duration of October 1, 2004 to September 30, 2009. A publication was published from multi-institutional effort addressing the relation tail docking to rectal prolapse in lambs. The committee members selected Virginia State University as the 2005 meeting site and elected Stephan Wildeus, VSU, as secretary of the technical committee. A total of 33 refereed journal articles on sheep production were published by members of the project.

Development of a Web-based Certification Program for Meat Goat Producers
VSU is also involved in the multi-state project, "Development of a Web-based Certification Program for Meat Goat Producers", No. 521276; USDA-IFAFS. Others involved are Langston University (lead institution); Fort Valley State University, GA; Kentucky State University, KY; Prairie View A&M University, TX, and Redlands Community College, OH. Members of the project, along with potential contributors, met for a "brain-storming" session in Atlanta, GA in September, 2004, to develop an outline teaching modules, and an overview of content for each module. At this meeting, potential author(s) for each module were identified and time lines established. Virginia State University will be responsible for the development of the "Reproduction and Breeding Module" and a paragraph outline and learning objectives for this module have been developed.

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

Training and Education in Support of Controls for Scombroid (Histamine) Poisoning
The Seafood HACCP Alliance was involved in helping to organize this educational program. Educational materials were developed and dissemination is currently being accomplished via state Sea Grant Programs. The educational material included a video (currently being completed) addressing the proper harvesting, handling and distribution of scombroid fish, a web-site is established that contains information on model HACCP plans for scombroid fish, model guidance for harvesting and proper chilling of scombroid fish, cooling curves for various scombroid fish, a large reference list of publications addressing histamine and scombroid fish, customized publications, models and brochures. The members of this project are working closely with the FDA Office of Seafood in order for this information to be fully used.

Good Agricultural Practices (GAP): Food Safety for the Farm
The Good Agricultural Practices (GAP) program is described as "on-farm food safety." Several outbreaks of food borne 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 GAP certification as a requirement for business. Farmers who are not trained or certified in GAP run the risk of being less competitive in the marketplace. The GAP program teaches proper on-farm practices from issues regarding manure use to proper cooling of harvested product. GAP training is a prerequisite to certification. Without GAP certification, producers may be at an economic disadvantage in the marketplace. Furthermore, adoption of GAP may significantly improve the safety of fresh fruits and vegetables. GAP program results are difficult to assess due to dynamics in the marketplace and the buyer-driven requirement for certification. 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 GAP-Certified status.

Southern Region Pesticide Safety Education Center
The Southern Region Pesticide Safety Education Center (SR-PSEC) is a train-the-trainer course for county agents, and state and federal regulatory personnel from all over the United States. Regulators from other countries sometimes attend as well. This program targets educators responsible for implementing pesticide safety training courses and regulators enforcing pesticide

use laws and regulations. PSEC participants, in turn, use what they learn in planning and delivering their Extension pesticide safety education programs. Working with Extension colleagues from all over the US, Mike Weaver and I helped to plan the PSEC curriculum. PSEC uses web-based preparatory lessons for PSEC participants that was designed by and is delivered by VTPP. As a PSEC instructor, I discuss and demonstrate the benefits of hands-on instruction (for adult education in general and for pesticide applicator clients), teach interactive sessions re: pesticide formulations, incompatibility, and label interpretation, and collaborate with the on-site session sponsors to adjust/"fine tune" the program content. Course sponsors have positive feedback and EPA funding.

National USDA Pesticide Recordkeeping CD for Farmers and an On-Line Course for Pesticide Regulatory Inspectors

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. Stemming from the CD Project was the development of an on-line course for pesticide regulatory inspectors who work with USDA to enforce the 1990 Farm Bill regulation requiring farmers to keep records of restricted use pesticide applications. The on-line course opened up new funding from USDA from 2003-05. It is anticipated that additional funds will be provided to maintain the course for a future use. The CD was a final product delivered to USDA in 2003. 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 being implemented in its final form in education programs nationally. It has been incorporated into the pesticide safety education program in Virginia. Extension agents are using it to train pesticide applicators. The outcomes of these activities are being monitored to obtain impact data. 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 has been partially completed by Virginia Tech and will be tested and delivered to the audience in 2005. In addition, one fortune 500 company has asked permissions to burn 20,000 CD's for distribution through their contacts in the Southern states.

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

Nutrition Camp

Each year the Washington DC Capital Area Food Bank and EFNEP/SCNEP work together to take limited income children to a 4-H Camp that is centered on nutrition education. The children are recruited by the Kids Cafe Program which is a Food Bank program that feeds hungry children in their neighborhoods. We have been raising money for the children to attend the camp. Approximately 50 children get to attend. The children come from Arlington, Alexandria, Fairfax and Washington, D. C. Some of the children have come from Maryland public housing sites but our work is a collaborative effort with only the Food Bank. The children participate in a normal camping program at the 4-H Center in Front Royal. The Food Bank people attend the camp with the children. Typically, they bring three employees that work with the children. The

rest of the volunteers and teen leaders are recruited by VCE employees. This camp addresses several critical needs: food insecurity and nutrition education. Since the highest obesity/overweight population is from low-income populations it is imperative they receive nutrition education. These children are under privileged in many ways. Giving them the opportunity to experience camp is an exceptional opportunity for each of them. Reaching youth at risk is one outcome. Nutrition prevention programs are also important outcomes/impacts of the week.

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

Southeast Natural Resources Leadership Institute

The first Natural Resources Leadership Institute (NRLI) for the southeastern region of the U.S. was held in Fall 2003 for leaders drawn from 13 states in the southeast. Funded by a special grant the U.S. Forest Service, the Southeast NRLI focused on environmental issues that transcend state boundaries and are regional in nature, It was designed to help leaders from the Southeast address difficult environmental and community issues. The Institute program was designed by a partnership of the University of Virginia's Institute for Environmental Negotiation (IEN), Virginia Tech's Center for Economic Development (CEE), and the Virginia Department of Forestry (VDOF). Faculty were also from North Carolina and Tennessee. The SE-NRLI consisted of a three-day session held in late September in Virginia followed by another three-day session in late November in the central southeast. Institute Fellows learned ways of moving people in conflict into collaborative problem solving through a mix of dynamic exercises, role plays, mini-lectures, field trips, and stakeholder panel discussions about specific regional "hot" topics. "It helped me become more effective in my work as a leader of environmental programs," said the director of a Virginia regional environmental nonprofit organization. "I have developed more confidence and knowledge in my efforts to bring people together on particular issues." A regional forester said the program provided "an excellent opportunity to become better informed on natural resource issues, work with some great people and develop valuable skills in facilitation and mediation."

National 4-H Wildlife Habitat Evaluation Program (WHEP) Invitational

Five-member teams from 22 states gathered in Blacksburg for a week (July 28 - August 1) of wildlife education and competition. The first day included an opening ceremony with state flag presentations and get acquainted activities. The second day consisted of education tours for the contestants and their coaches and a Share Fair organized by states. The third day was the contest for the youth teams while adult chaperones were taken on an educational tour of their own. Youth were tested in wildlife foods, habitat requirements, management plans (both rural and urban) and aerial photo interpretation. The final day included recreation trips such as white water canoeing, hiking and rock climbing and the closing awards banquet. Evaluations were conducted by the Virginia committee and the National WHEP committee. This contest was rated among the highest in quality and effectiveness of any of the former contests. In addition, the Virginia team won first place. This is solely due to the commitment of the team's coach and her members. The Virginia WHEP committee was so busy planning for the national contest that we had almost forgotten we had a state team.

Mid-Atlantic Water Quality Program
During the indicated period, the multi-state team was developing region-wide budgets documenting phosphorus inputs and outputs at the state and county level to be used in water quality extension. The project had not yet reached the stage of extension delivery. The program is designed to address educational needs of 1) farmers and their organizations, 2) public sector water quality managers, and 3) the general public. It has no specific focus to under-served or under-represented audiences. The Mid-Atlantic Water Quality Program will: 1) Develop focused regional educational programs on topics of regional or national importance for which we have or can access expertise; 2) Develop relationships with target audiences - regional offices of Federal agencies, regional organizations, States, stakeholder groups - to provide research and science information; 3) Improve coordination, cooperation, communication and information sharing among water quality programs at participating institutions; 4) Become the voice for Extension water quality programs in the Mid-Atlantic. Some current Regional Activities include: developing a drinking water assessment and education tools for underserved farming communities in Virginia, Delaware and Maryland, and assessing water quality impacts of small and specialty farms; developing education materials on policy issues such as TMDLs, the federal CAFO rule, water quality trading, and the water quality impacts from small AFOs; developing educational materials for homeowners on proper lawn care, and facilitating information exchange among urban nutrient management professionals; developing outreach materials for the agricultural community on the emerging science and management of ammonia emissions from animal operations; refinement of regional P- Indices and coordination among State management tools; and developing state phosphorus budgets over time, and developing educational materials for managers and decision-makers.

Washington Area Metropolitan Transit Authority Landscape Training
Extension personnel from Washington DC, Virginia and Maryland worked collaboratively on an education program for landscape employees of the Washington Area Metropolitan Transit Authority (METRO). Proper pruning, planting and pesticide safety were among the topics discussed. This activity allows for METRO employees to be educated on the use of sustainable landscape management practices at their facilities. It contributes to the overall athletics of the facilities and contributes to a healthy environment in an urban setting. Many issues that are critical such as water quality, pesticide use and storm water run off are affected by sustainable landscape management practices.

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

4-H International Exchange Program
The 4-H International Exchange Programs provides experiential educational and development experiences that: help young people and their families understand the importance of knowing about other countries and the U.S., and their respective cultures; instill positive cross-cultural attitudes and skills that enhance mutual understanding and acceptance of all people; expand the opportunities for young people to experience global citizenship responsibilities in today's interdependent world; increase self-esteem and confidence through adapting to new situations; learn languages and communication skills; and, increase overall global awareness. Over 1000 U.S. families benefited from these experiences in '03-'04 by hosting an international delegate or

by having a 4-H member travel overseas to live with a host family. While 4-H international exchange programs involve people of all races and socio-economic backgrounds, the inherent mission of the program serves to develop attitudes in young people that will make them more accepting of people different from themselves. Evaluation information taken from 4-H Japanese Exchange Program Evaluation Report, of December 2003, documented the following. Youth traveling to Japan rated the following life skills as those most affected by the trip: appreciating another culture, making friends with new people, understanding they have a lot in common with people from other cultures, sharing their experience with others, being comfortable in new situations, caring about people who are different than themselves, being responsible for themselves, and being resourceful. Host youth reported the following as most significant: understanding they have a lot in common with people from other cultures, caring about people who are different than themselves, appreciating another culture, and sharing their experience with others. Host adults reported that the experience of hosting an international student helped develop the following life skills in their children: understanding they have a lot in common with people from other cultures, appreciating another culture, sharing their experience with others, making friends with new people, caring about people who are different than themselves, accepting differences in others, introducing another person to strangers, working in cooperation with others, and being comfortable in new situations.

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 (Virginia Tech)
State Virginia

Check One:
_____ Multistate Extension Activities
__X__ Integrated Activities (Hatch Act Funds)
_____ Integrated Activities (Smith-Lever Funds)

Title of Planned Program Activity	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
1) To achieve agricultural production system that is highly competitive in the global economy.	204,000	257,000	246,000	250,000	300,000
2) To provide a safe and secure food and fiber system	55,000	59,000	50,000	40,000	65,000
3) To achieve a healthier, more well-nourished population.	34,000	40,000	20,000	30,000	49,000
4) To achieve greater harmony (balance) between agriculture production(production activities) and (stewardship and protection of) the environment.	49,000	56,000	50,000	45,000	72,000
5) To enhance economic opportunities and the quality of life among families and communities.	54,000	63,000	55,000	56,000	70,000
Total	$396,000	$475,000	$421,000	$421,000	$556,000

Craig Nessler — **Director**
5/2/2005 — **Date**

Form CSREES-REPT (2/00)

Note: 14% target of $548,549 was met in FY 2004

Brief Summaries of Integrated Activities (Hatch Act Funds)

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

Extracellular Matrix, Steroid Receptors, and IGF-I Axis Molecules in Bovine Mammary Development

Mammary growth that occurs during the peripubertal period sets an essential foundation for future milk production. However, mechanisms responsible for future effects are poorly understood. This is the focus of this project. We will quantify effects of GH and the ovary on proliferating populations of putative mammary stem cells, assay mitogenic activity of mammary extracts, and 3) evaluate ontogeny of expression of local acting molecules. About one third of the 9.3 million lactating dairy cows are replaced as heifers each year. Our data indicated that local tissue factors within the developing udder regulate growth of mammary ducts and therefore impact future productive potential. Specifically, local tissue synthesis of extracellular matrix proteins likely modulates the capacity of growth factors and hormones to stimulate growth of mammary epithelial cells.

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. The economic analysis provides growers and advisors data on which to make decisions for reducing tillage and changing cropping systems in the mid-Atlantic region. These data also illustrate to grain buyers that the price levels associated with barley and wheat production during this period of study are not conducive to maintaining production in the mid-Atlantic Coastal Plain region, except on very productive soils.

Genetic Selection and Crossbreeding to Enhance Reproduction and Survival of Dairy Cattle

Many dairy producers are experimenting with crossbreeding to improve survival, fertility, disease resistance, and dystocia. Our project intends to quantify difference between purebred and crossbred animals for these traits. Many dairy producers are considering or have implemented some form of crossbreeding in their dairy herds, but expectations of results are dated or not available. The crossbreeding trial will allow us to estimate breed and crossbred differences for health, fitness, fertility, productivity, and survival under a confinement management system. As several of these traits have low heritability and will respond slowly to selection, crossbreeding may offer a more rapid method of improving cow performance in the short term, and may produce more profitable cattle across entire productive lifetimes. Heat stress is a detriment to milk production, especially in the Southeast region of the country, where heat abatement systems are either less prevalent or less effective in combating the combined effects of high heat and humidity at certain times of the year. Our study will help us understand the role of genetic differences in how cows manage heat stress. By comparing cows of different breeds in the same herd, we are better able to measure true breed differences in heat stress response relative to projects that simply compare breeds of cows in different herds. The results may

enable us to suggest more profitable breed mixes for dairies in heat stressed regions of the country, and may allow us to predict possible utility of crossbreeding systems for heat stress management.

Development of Nutritional Strategies to Optimize Swine Productivity Under New Regulatory Conditions

Unnecessary supplementation of vitamins in swine diets increases costs and reduces profit. This project critically assesses the need to supplement the vitamin folic acid. This project also investigates the potential to reduce nitrogen and phosphorus excretion into the environment by supplementing new sources of phytase enzyme in swine diets and the potential to remove antibiotic feed additives from swine feeds. Inclusion of feed grade spray-dried plasma protein (SDPP) in unmedicated diets for weanling pigs improves feed intake and growth performance. However, this improvement is unrelated to alterations in digestibility of crude protein in the diet. Under conditions in which medicated feed additives are not allowed or are discontinued in weanling pig diets, SDPP offers one alternative for enhanced growth and health in early weaned pigs. The most strategic period of use for SDPP would be in the initial post-weaning diet phase.

Nutritional Systems for Swine to Increase Reproductive Efficiency

Excretion of nutrients from animals on commercial swine farms has been identified as one of several agricultural contributors to excess deposition of nutrients into the environment. However, the magnitude and conditions of nutrient excretion from swine breeding farms is poorly understood. This project seeks to quantify variation and overall contribution of swine breeding farms as contributors of excess agricultural nutrients into the environment. Resulting data can ultimately be used to develop strategies for reduction of nutrient excretion from swine breeding farms. The use of hulless barley in swine diets or high quality hulled barley coupled with dietary fat supplementation results in diets that yield performance and nutrient excretion potential similar to corn or wheat based diets. This offers producers alternative feed ingredients depending on grain availability and cost conditions without negative impacts (i.e. increased excretion) on nutrient excretion into the manure collection and storage system on commercial farms.

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 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 designed to develop techniques for improving management of soybean leaf feeding insects and mite pests of peanut. Significant progress was made towards investigating the role of insecticides in reduction of tomato spotted wilt virus (TSWV) in peanut. In-furrow treatments of either aldicarb or phorate in different combinations (aldicarb at 1.18 kg ai per ha, phorate at 1.12 kg ai per ha, aldicarb at 1.18 plus phorate at 0.78 kg ai per ha, aldicarb at 0.56 plus phorate at 1.12 kg ai per ha, aldicarb at 0.56 plus phorate at 0.78 kg ai per ha) resulted in a significant reduction in the number of diseased plants. Yields were significantly greater with all treatments (range 4,634 to 5,326 kg per ha) compared with the untreated control (2,826 kg per ha). The addition of foliar treatments with acephate (at 0.4 kg ai per ha) during the season resulted in fewer diseased plants compared with in-furrow treatments, alone. Aldicarb treated plots yielded less (3,332 kg per ha) compared with

phorate treated plots (4,212 kg per ha). The highest yield was achieved in plots where phorate was used along with four applications of acephate (5,165 kg per ha).

Dynamic Soybean Pest Management for Evolving Agricultural Technologies and Cropping Systems

Soybean growers have recently experienced increases in certain insect pest problems and the introduction of a new and potentially significant pest species. Soybean aphid, introduced from Asia, is now widespread across much of the US and could result in production losses and increased insecticide use. This project coordinates the efforts of entomologists across the US to conduct pest surveys and develop control tactics. Multiple statewide surveys were important for supporting growers with up-to-date insect pest information. A survey of 1,144 corn earworm/tobacco budworm eggs collected from 12 counties and identified to species allowed growers to direct their control programs to the predominant pest, corn earworm. Insecticide resistance of corn earworm, the primary insect pest of soybean, was monitored by collecting and testing 2,498 moths from throughout eastern Virginia. An overall survival rate of less than two percent indicated only very limited resistance levels in local populations. These results allowed growers to select the most effective and economic products for their control treatments. A large survey of 78 fields in 36 counties showed that Asian soybean aphid, a new soybean insect pest, was present throughout Virginia and at economic threshold levels in some fields. For the first time in Virginia, soybean was treated for this pest (an estimated 625 acres, or 253 hectares) which prevented losses and further spread.

Optimum Dairy Breeding Programs for Profitability

Dairy producers face tightening economic pressure in their operation. 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 PTA DPR has a significant economic value when considered alone. However, the appropriate economic weight when the impact of all the other traits included in NM$ are considered, the weight is significantly smaller and is even negative in some pricing scenarios. The reduced economic weight is the result of some of the positive economic effect also being explained by PTA Milk and PTA PL. The negative relationship between PTA DPR and PTA Milk and the positive relationship between PTA DPR and PTA PL substantially reduce the economic weight coming out of the multi-trait model.

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

Semiochemical-Based Management of Two Pest Complexes in Virginia Apple Orchards

Plum curculio is a pest with no adequate sampling method, with no control besides pesticides, and with unknown life history variables that pose export questions. Mating disruption is a control tactic for codling moth but is currently too expensive for eastern apple growers. This project develops trapping systems for plum curculio and answers life history questions. This project develops a more economical approach to mating disruption. Our work on plum curculio has importance in clarifying the ecological aspects of plum curculio strains. The distribution of these strains has great importance for Virginia apple growers because this species has become an

export issue. The importance of this is increased by the increasingly global marketplace in which our growers must compete. Furthermore, this study will have importance in the biosystematics of this species. Our work on mating disruption for fruit pests offers a non-toxic method with which to control several key pests. Development of sprayable formulations will make this approach much more practical for growers to apply, enhancing the prospects for adoption. This work is especially timely with recent regulatory pressure on organophosphate insecticides (through FQPA). There is currently elevated grower interest in mating disruption. Results from this portion have already been incorporated into our written multi-state commercial control recommendations.

Enhancing Food Safety Through Control of Food-borne Disease Agents

Certain agricultural practices contribute 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. This study demonstrated that storage temperature, species of fish, initial bacterial load, package atmosphere and packaging film oxygen transmission rate all must be considered during product development and for prescribed storage conditions. The following general guidelines are appropriate for all ROP refrigerated fishery products: 1) refrigerated storage of ROP fishery products requires storage temperatures of 40 F (4 C) or less to ensure product safety from the time of packaging, through distribution and storage by the consumer, 2) safe handling of all ROP refrigerated fishery products requires the maintenance of proper product temperatures from packaging through consumption, 3) a keep refrigerated label is required on each master carton and on each individual package, and 4) a use by date on each package is highly recommended.

Evaluation of Fall Broccoli Cultural Systems, Post-Harvest and Marketing of Crown-Cut Product

Commercial vegetable production needs to remain a viable farm option for the tobacco dependent and economically depressed region of SW Virginia. Profitable crop alternatives and methods to produce them, need to be developed for current and future growers. This project examines the market potential and production methods needed for successful introduction of fall-grown, large crown-cut, film-wrapped broccoli, and development of it as a new product: "Virginia Style" broccoli. This project is in the early stages, but limited impact can be reported. Production and marketing trends are emerging to impact grower decisions: Production: Plasticulture results in improved growth and yield, and a superior product. For Virginia growers, fall broccoli after a summer crop can help recover seasonal investments in plasticulture. Increased days to maturity in scheduling should be considered for late harvests. Though cold tolerant, late fall harvest increases risks of freeze damage, with loss at less than neg 3C. Supplemental nitrogen should be applied to no-till systems to compensate for reduced yields. Low densities result in a high percentage of large heads, but decreased plant number is the trade-off. Effective spatial arrangement can increase head counts, but should allow for maximum sizing. Target head size is not reached by all plants, but can be improved by careful management. Continued evaluation is needed of new cultivars for crown-cut suitability, and productivity under Virginia conditions. Marketing: Film wrapping appears to be a superior method of handling broccoli versus icing. This has far reaching impact to growers in Virginia

and other production areas. It provides opportunity to grow this crop without need for access to icing, and reduces transportation costs. In-store comparisons indicate consumer acceptance of film wrapped, crown cut product over iced, non-wrapped broccoli. Appearance, freshness, quality, and useable mass in the head were likely reasons for preference, and food safety provided by film.

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

The Role of Antioxidant Supplements on Mitochondrial Function
Harmful oxidants, present in our food, air and water are responsible for conditions such as aging, heart disease, cancer, arthritis, diabetes, cataracts and Alzheimer's disease. We will look at the effects of potential food antioxidants to reduce the effects of oxidants on subcellular units in cells from farm animals. Obesity in humans is strongly related to heart disease and type 2 diabetes. We suspect that a reduced expression of uncoupling protein 2 (UCP2) in mitochondria of many cell types leads to excess calorie storage and therefore related to oxidative stress, obesity, impaired exercise performance and immune response because UCP2 functions to wastefully expend calories. Our data on the role of UCP2 in mitochondria has been surprising, revealing that the lack of expression of this gene does not appear to affect body weight or body fat and the response of mice to challenges imposed by exercise. Perhaps this is because a companion gene, coding for uncoupling protein 3 is expressed to excess compensating for the missing protein. Lipoic acid (LA) has been shown to minimize the impact of a diet rich in carbohydrate in humans. We believe that this is due to an antioxidant effect of lipoic acid. We plan to determine if LA can be an effective supplement for people predisposed to type 2 diabetes by reducing oxidative stress and inflammation caused by a carbohydrate-rich and fat-rich meal.

Biogenic Amines in Finfish Species
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. 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. State and federal food regulatory agencies may establish unrealistic low defect action levels unless the presence and significance of concentrations are identified, which could lead to unnecessary product loss and litigation. High pressure processing was able to reduce the microorganisms responsible for the production of biogenic amines in certain fish species commonly consumed (scromboid and scromboid-like species). The technology could result in substantial reduction in scrombotoxin illness.

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

Stream Habitat Modeling to Support Water Management Decisions
The study will aid in developing appropriate water supply and protection plans for surface waters. The findings will permit relevant tradeoffs to be made between instream values and offstream use. This research is designed to develop and test mathematical models that can be used to describe expected changes in habitats and associated fish and aquatic life that could arise due to alternative water use practices, in particular instream flow protection. This project area is in one of the fastest growing regions of Virginia and the top agricultural producing counties of

Augusta and Rockingham. Water needs for environmental flows have been quantified to permit long term planning for water resources.

Implementation of a Novel Biological Control Strategy for Plant-Parasitic Nematodes
Plant-parasitic nematodes devestate 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.

Fish and Shellfish Technologies
Recirculating aquaculture presents an economic opportunity for the production of a variety of fresh and salt water fish species. The technology conserves resources and provides an opportunity to have complete control over the growing conditions of the fish being cultured. Harvests of wild fish can no longer supply the demand for fish in the United States. Approximately two-thirds of our nation's fish supply is imported. Unfortunately, the technical and scientific requirements for the design and operation of successful recirculating aquaculture production systems has not been determined. As a consequence, production costs are not competetive with domestic wild harvests or foreign imports. Also, fish have not been genetically selected for compatability in recirculating aquaculture systems. Unless wild fish can be domesticated, losses will occur through diseases and physiological stresses. Recirculating aquaculture systems may be the production systems of necessity due to the decreasing availability of ground water and the lack of streams for flow-through systems. The purpose of this project is to study some of the major impediments impacting the commercialization of tilapia and yellow perch in recirculating aquaculture systems. Recirculating aquaculture firms will be able to reduce the organic strength of their liquid waste streams resulting in increased firm profitability. Also new products and industries have been developed from aquacultural byproducts which represented a cost rather than a profit. The ability of recirculating aquaculture enterprises to develop other agriculture business enables firms to spread the economic risk thereby preventing one market from adversely impacting business profitability.

Management of Wildlife Damage in Suburban and Rural Landscapes
Damage from human-wildlife conflicts has reached unnacceptable levels (more than $2 billion annually nationwide) and social acceptance of wildlife is declining. This project examines social perception, tolerance, and acceptance of wildlife damage and provides new methodologies to resolve human-wildlife conflicts. The survey and conference were important in identifying critical needs and existing problems in successfully resolving human-wildlife conflicts. It is very apparent that communities do not understand what the various resource management agencies do, what services these entities can provide, how they are/are not coordinated or what current

law and regulation allows communities to do, relative to response to damage situations. Therefore, I and my colleagues at CMI are creating the Center for Human-Wildlife Conflict Resolution, a university and cooperative extension partnership. This Center will have a 4-part mission: coordination, information dissemination, education and training, and research. This Center will become the one-stop shopping outlet for information, resources, and education and serve to coordinate all the other players in this arena.

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

The Economic and Psychological Determinants of Household Savings Behavior
US households lack adequate savings. Without a financial cushion they cannot maintain financial stability. The purpose of this project is to identify the economic and psychological factors that act as barriers to savings and to develop an index of savings behavior. Produce a model that identifies progressive saving stages based on economic, psychological, and demographic factors. Identification of psychological and economic strategies to influence consumers such that they are able to actualize to a higher stage of saving behavior. Enable educators to develop educational interventions with consumers to increase their savings.

Determinants of Rural Poverty in Virginia and the United States
Economic growth during the 1990s contributed to substantial reductions in poverty in some areas, but, but in other areas, poverty actually grew. Little is known about the relationship between economic growth and poverty reduction and cases where growth does not reduce poverty. This project examines the determinants of changes in poverty between 1990 and 2000 in the rural US. Factors such as economic change, human capital attainment, policy shifts, etc. will be examined. Information on how common policy variables affect and influence levels of and changes in rural poverty will be determined. This will enable decision makers to formulate poverty-reducing strategies.

Rural Older Virginians with Chronic Health Conditions: Behavioral and Psychosocial Influences on Quality of Life
The lifestyles of older adults are challenged by chronic health problems. The purpose of this project is to gather empirical data from older rural adults with chronic health problems to learn more about the personal, social, and economic impact of conditions such as heart disease, osteoporosis, diabetes, and persistent pain in their daily lives and the ways in which the older adults successfully manage their health conditions. The information gained from this study will contribute to the paucity of empirical research comparing management issues and concerns across chronic conditions and yield implications for service delivery for agencies concerned with aging, health, and quality of life issues.

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 (Virginia Tech)
State Virginia

Check One:
_____ Multistate Extension Activities
_____ Integrated Activities (Hatch Act Funds)
__X__ Integrated Activities (Smith-Lever Funds)

Title of Planned Program Activity	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
1) To achieve agricultural production system that is highly competitive in the global economy.	$397,000	$547,000	$641,000	$600,000	$560,700
2) To provide a safe and secure food and fiber system	72,000	129,000	142,800	14,000	112,800
3) To achieve a healthier, more well-nourished population.	27,000	16,000	5,400	6,500	71,100
4) To achieve greater harmony (balance) between agriculture production(production activities) and (stewardship and protection of) the environment.	142,000	166,000	144,400	118,000	154,500
5) To enhance economic opportunities and the quality of life among families and communities.	90,000	17,000	32,000	225,000	79,800
Total	$728,000	$875,000	$965,600	$963,500	$978,900

Patricia Sobrero — **Director**
5/2/2005 — **Date**

Form CSREES-REPT (2/00)

Note: 14% target of $964,900 was met in FY 2004

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

Crossbreeding in Dairy Cattle
This project, begun in 2002, is a long term breeding experiment that will require 8-10 years to complete. We have bred Holstein and Jersey cows in University herds at Virginia Tech, U. Kentucky, and NC State to four Holstein and four Jersey bulls, producing calves in four breed groups: purebred Holsteins, Holstein sired calves out of Jersey dams, Jersey sired calves out of Holstein dams, and purebred Jerseys. The oldest animals are in the Virginia Tech herd and are about 15 months old. At the other extreme, cows are just being bred to produce calves at NC State. Kentucky heifers are about six months younger than at Virginia Tech. We intend to produce about 40 females per breed group at Virginia Tech, about 20 per breed group at Kentucky, and about 15 per breed group at NC State. Calves will continue to be born to the project at least through 2006. We are breeding the F1 crossbreds to two different third breeds: Brown Swiss and Swedish Reds. The oldest F1 heifers are now about three months pregnant to bulls of these breeds. We don't have many results to deliver to clientele yet. We have published abstracts at the annual meeting of the American Dairy Science Association, and have related research trials in progress that will produce publishable results in the next 12 months. We have shown the calves/heifers to dairy farmers participating in tours of the new dairy facility at Virginia Tech in August 2004 and will conduct more such workshops in the future.

Soybean Rust: A New Pest of Soybean Production
The focus of this project was to develop control strategies for Asian soybean rust, to secure Section 18 registrations for fungicides to reduce losses from Asian soybean rust, to develop educational materials to educate soybean growers and crop consultants and agri-business personnel about the biology, epidemiology, control, and economic impact of Asian soybean rust in Virginia and throughout the US, and to develop survey and detection programs to alert soybean growers as to the incidence of Asian soybean rust in US. All of the above are critical issues to all soybean growers in the US and Virginia. The program is expected to educate soybean growers to utilize control strategies to their best economic advantage and to use control strategies only when there is likelihood that there will be a significant economic benefit.

Pesticide Resistance Monitoring for Corn Earworm in the Mid-Atlantic States
Corn earworm (also known as soybean podworm, tomato fruitworm, and cotton bollworm) is a primary insect pest of corn, several vegetable crops, soybean, cotton, peanut and some ornamentals. The immature stage (caterpillars) feed directly on plant fruiting structures (e.g., sweet corn ears, tomatoes, soybean pods, cotton bolls) causing huge losses in crop yields and quality if not controlled. Acceptable control often requires numerous insecticide applications during each season. Most growers apply insecticides in a single chemical class, the pyrethroids, and there is growing evidence that corn earworm may be developing resistance to these insecticides. In the past, pyrethroids have offered an effective and relatively inexpensive control alternative. Loss of susceptibility (resistance development) would increase production costs, as growers would make more frequent sprays using higher dosages, and would also result in more crop damage. Entomologists in several mid-Atlantic states (Virginia, Delaware, Maryland, New

Jersey, and Pennsylvania), in cooperation with State University of West Georgia, coordinated efforts to monitor the pyrethroid insecticide resistance levels of corn earworm, a major insect pest of many crops grown in the region. Cooperators met via telephone conferences and email to establish protocols for evaluating their local corn earworm populations. Live insects were captured throughout the 2003 and 2004 growing seasons, returned to the respective laboratories, and tested using glass vials pre-treated with identical amounts of pyrethroid insecticide. Cooperators forwarded results to this Virginia Tech specialist for comparison and summary. Results have been distributed to all cooperators and presented in regional and national meetings and in respective states' production meetings to alert growers of the situation. Results of this activity have shown that some corn earworm populations in some areas are exhibiting near critical levels of pyrethroid resistance. Researchers and extension programs must now develop alternative control and resistance management strategies including shifting to non-pyrethroid insecticide alternatives and improving IPM control programs that reduce reliance on insecticides. New recommendations will be forthcoming as these program activities progress. Virginia data indicated that, with the exception of Eastern Shore, most corn earworm populations remain susceptible to pyrethroids (lack evidence or resistance). However, plans are in place to continue monitoring and to emphasize alternative control options.

Southern IPM Center

The Southern IPM 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 North Carolina State University in Raleigh. Member states are developing crop pest management 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 (FQPA). The profiles and the plans are used by USDA and EPA to assess the continued registration of pesticides in the United States and to determine if alternative controls are available to offset the loss of chemical pesticides. 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. Stakeholder committees assist with crop profile development and participate in crop specific pest management strategic planning meetings. They also assist in the writing and editing of publications associated with this process. 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. Stakeholder data and publications from this process are used by stakeholders to support grant proposals for IPM and other USDA funds to support crop production and pest management extension and research programs in the States.

Horticultural Crops Entomology
This is a large-scale demonstration trial, conducted in commercial orchards in MI, NY, NJ, PA, WV, VA and NC, in response to changing pesticide regulations under the 1996 FQPA. The project seeks to evaluate the fit, cost and effectiveness of insect and mite pest management programs in apples and peaches that do not include conventional, broad-spectrum pesticides (i.e. organophosphates, carbamates, pyrethroids). Rather, these programs involve the exclusive use of new pesticide chemistries and IPM based pest control tactics that are considered safer to infants and children, farm workers and the environment. This four-year project is entering its final year. The results from the work have been disseminated to growers at off-season trade shows and conferences and at in-season production meetings. This activity directly addresses critical needs of stakeholders who are increasingly in need of effective and affordable options to organophosphate pesticides for managing the key arthropod pests of apples and peaches. The expected outcomes and impacts were identified from the outset of the project. One key outcome is a cost-benefit analysis of the reduced risk program, developed by agricultural economists at Penn State University. This outcome/impact will not be fully developed until the project has been completed. Other outcomes relate to levels of awareness, confidence in and adoption of some of the new chemistries or pest management approaches promoted by the RAMP program. Again, these may not be fully developed or recognized until project completion.

Virginia Tech On-Farm Replicated Soybean Plots for Eastern Virginia
This project is funded by the Virginia Soybean Board and participating agribusiness (in-kind). Plots look at varieties, technologies, and other production practices. Plots provide data to help agribusiness and producers make management decisions that can increase production or improve profits. The results are shared through Extension to all soybean producers in the State. Agents work closely with the Virginia Tech Soybean Specialist to carry out the work. The plot work impacts over 400 producers and over 200,000 acres of soybeans. The Soybean Board, made up of producers, assisting agents, and the Soybean Specialist work together to identify the scope of the research. Producer input is extremely valuable to the success of the program. The research is generally based on the concerns of producers. The funding partner, Virginia Soybean Board, is very satisfied with the work. They consider it the "biggest bang for their buck." Through evaluations used at winter production meetings, producers have acknowledged the incorporation of the findings of the plot work and believe it to be a way to reduce input costs and improve profits. Some of the practices identify ways to decrease pesticide use and exposure and to improve the environment and to reduce dependence on pesticides and their risks. Evaluations, surveys, and word of mouth are the primary means of identifying outcomes/impacts.

An Evaluation of Pasture-Based Dairy Systems to Optimize Profitability, Environmental Impact, Animal Health, and Milk Quality
The objectives of this project are to: 1) Examine and quantify factors affecting economic and production efficiency of environmentally sound pasture-based dairy systems in the region; 2) Characterize potentially beneficial differences in the composition of milk produced under pasture-based production systems; 3) Characterize the antioxidant components of forages and their impact on cow immunocompetence and health; and, 4) Provide interactive educational programs for dairy producers and industry leaders to enable them to make informed production and management decisions. This project addresses the concerns of: consumers interested in health fostering aspects of CLA's from pasture based diary production, farmers interested in

profitable production management recommendations for pasture based diaries, and individuals interested in improved environmental quality from animal production systems. This project will provide direct research and educational support to underserved family-owned dairy producers in the Mid-Atlantic region and will be applicable to grazers elsewhere. We have not completed the project, as of now research data is being collected, we do not know the results of CLA's content based on animal diets or antioxidant impacts of forage diets on cow health or the profitability of the competing systems.

Aquaculture

This integrated research and extension project is titled: Nutrition, Immunity, Economics, and Field Demonstrations of Sunshine Bass. Kentucky State University is the lead agency with Virginia State University as a sub-contract. Three new hybrid striped bass farming operations were initiated during this period. The four sunshine bass cage and pond culture demonstration sites established in Virginia at three cooperating farms and at Virginia State University were maintained during 2003-04. Production supplies, feed and fingerlings were made available to cooperating demonstration farms and progress monitored. Water quality, feed consumption, aquatic weeds and fish growth were monitored. One new operation was established, and the permitting process initiated for two new hybrid striped bass production operations in Virginia. A population of sunshine bass was over-wintered in greenhouse tanks to extend the growing season. The program addresses several important issues identified by stakeholders. The most important issue was economic viability. Hybrid striped bass farming in ponds has been shown to provide positive cash flows. Family farms can incorporate hybrid striped bass into enterprise mix. Environmental impacts are limited due to discharge regulations for hybrid striped bass facilities. The USDA-KSU project sunshine bass demonstration ponds (pond fingerling, pond food-size and cage culture) at Virginia State University were the focus of individual prospective farmer tours, multiple group visits (36), and served as one of the primary stations at the VSU Annual Field Day. In addition, more than 50 educational visits were made to the operations at private cooperating sites. Market developments include direct sales of whole fish on ice, fee fishing, and initial testing of small, skin-on fillets. Seasonal market demand for fish sold on ice remained at $6.82 per kilogram. The sunshine bass project was the focus of several educational presentations during the year.

Management of Phytophthora ramorum in U.S. Nurseries

Laboratory work has developed a protocol that provides more accurate detection of this destructive pathogen in plant tissues. We surveyed nurseries of high risk in Virginia for this pathogen in 2003 and 2004. We also assisted Virginia Department of Forestry and Department of Interior/National Park Service/Shenandoah in surveying for this pathogen. One extension publication and several newsletter articles were developed to guide the industry and homeowners on identification of sudden oak death and how to prevent this pathogen from entering Virginia. Several talks at local and state levels were conducted to educate the industry personnel on disease identification and prevention. Clientele were also posted of new developments by emails. One nursery in California lost $3.5 million within a month after detection of this pathogen in its plant materials. The industry was greatly concerned that introducing this pathogen to Virginia would put some nurseries out of business. The public was also very concerned that this pathogen will affect all the oak tress in the natural forests. Extension publications and talks addressed these concerns in a timely fashion. Extension programs have

certainly helped to reduce the risk of sudden oak disease and quarantines on nursery materials grown in Virginia.

Water Quality Methodology for Crop Protection Chemicals
The objectives of the project are: 1) Compare and evaluate various solid phase extraction techniques using disk, fiber and cartridge devices for sampling water for a wide range of crop management chemicals; 2) Investigate the storage stability and transportability of crop management chemicals extracted utilizing various SPE matrices for application to field extraction procedures; 3) Investigate the problems associated with the usefulness of successful SPE matrices for investigations involving turbid water samples; and 4) Investigate the feasibility of using developed procedures for field extractions for crop protection chemicals. The improvement in analytical techniques for the analysis of crop management chemicals is important to air, soil and water resource conservation and enhancement, natural resource and ecosystem management, environmental policies and regulations, risk management and assessment in agricultural systems, and agriculture-related social and consumer concerns which are associated with these Goals. To accomplish these goals we have to be able to provide valid and sensitive analytical techniques for the presence of crop management chemicals upon which the general public and our stakeholders can rely. The team has met twice and conducted the first year experiments as proposed. The results are now compiled for submission of a manuscript entitled, "Pesticide Extraction Efficiency of Two Solid Phase Extraction Disk Types after Extraction and Shipping."

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

Seafood Technology
Audits were preformed on fishing vessels and in processing facilities to determine how handling practices affected the formation of scrombotoxin in scombroid and scombroid-like fish species. Assistance was provided management personnel on developing HACCP (Hazard Analysis Critical Control Points) plans to control toxin formation. Studies were also conducted on post-harvest treatments to determine their effectiveness in reducing or eliminating histamine forming microorganisms. The primary control studied was high hydrostatic pressure processing. Histamine is one of the five major health related issues identified by the U. S. Food and Drug Administration. The agency has taken regulatory action, including proceedings in the federal courts, against firms that have not effectively controlled the environmental conditions that promote toxin formation. Audits conducted by federal and state public health regulatory agencies in the three states participating in the project (Maryland, North Carolina, and Virginia) have shown all vessels and processing facilities to be in compliance. Also, all fish samples analyzed for the presence of histamine and other biogenic amines, have produced either no measurable levels or levels at a maximum of 3 ppm histamine/g. The 3 ppm/g is substantially below the regulatory guideline of 50 ppm/g. The project has been effective in bringing safe and wholesome products to consumers.

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

Healthy Weights for Healthy Kids

Overweight is growing at epidemic rates among American children and adolescents. Conversely, eating disorders are also increasing, particularly among girls. Proper nutrition, physical activity, and positive body image have been shown to be critical for children to achieve healthy weights, in addition to optimal physical and emotional health. Recent research has also documented the relationship between healthy diets and physical activity with academic achievement. Healthy Weights for Healthy Kids is an experiential learning experience in nutrition, physical activity, and body image for children with topics based on emerging trends and research findings. The purpose of Healthy Weights for Healthy Kids is to provide Extension Agents and program assistants with a hands-on and user-friendly curriculum that addresses key research-based concepts related to healthy weights. The curriculum is designed to be taught to children between the ages of seven and 14. This age group represents a crucial time to foster healthy behaviors and attitudes to promote lifelong health and positive attitudes. An evaluation tool was developed and tested specifically for this curriculum to determine impacts. Those results are now being aggregated and analyzed. Healthy Weights for Healthy Kids was initially developed and tested with limited resource youth enrolled in the Virginia Smart Choices Nutrition Education Program (called the Food Stamp Nutrition Education Program in other states) meaning that 50% of groups were eligible for free or reduced school lunch. As a result, foods and activities that are described in the curriculum are low-cost and achievable regardless of income level. Evaluation results document the following: Increased knowledge of the importance of nutrition and the Food Guide Pyramid. Children are not eating enough whole grains, fruits, and vegetables and eating too many high fat and sugary items. Only two percent of school-aged children meet the Food Guide Pyramid serving recommendations for all five major food groups. Help children explore ways to enjoy food in moderation. Portion sizes have increased over the past 20 years. Foods offered by fast food chains, often are two to five times exceed the Food Guide Pyramid serving sizes by at least a factor of two and sometimes eight -fold. They tend to be high in fat and sugar. These choices also replace other foods and drinks that are rich in nutrients, like fruits and vegetables. Teach students about healthy drink choices. More and more children are drinking soft drinks or sodas on a regular basis. Non-diet sodas are high in sugar and provide “empty calories,” meaning they don’t contain vitamins and minerals, only calories. They also replace other drinks, such as water, milk, and 100% juice, and may reduce their appetite for important foods. Increase awareness of healthy snack options. Children have more access to snack options than in the past, with more vending machines available in schools. Snacks tend to be higher in calories and fat than meals. Expose children to different types of physical activity and emphasize the importance of physical activity for physical and emotional health. Inactivity is common among youth. Nearly half are not vigorously active on a regular basis. The average child or adolescent watches an estimated three hours of television per day (and does not include watching videos or playing video games). Low levels of physical activity are associated with overweight and poor health. Improve attitudes and respect towards diversity, including different sized and shaped individuals. A healthy weight is different from one person to another. Children come in different sizes and shapes. Some kids are naturally larger, others small. Many youth are striving to be a size that is unrealistic and unhealthy for their body type. This can lead to low self-esteem and confidence.

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

Overhead Utility Compatible Trees

Trees deemed to be more compatible in size with overhead utility lines are selected and trialed at the Hampton Roads AREC, and are starting to be trialed at utility line arboreta in other locations in Virginia. The research results are delivered via an extension publication that is available on-line, through presentations, through HRAREC Field Day demonstrations, through magazine and newspaper articles, and through client visits to the utility line arboreta. The program directly addresses the critical issue to inappropriately sized trees, planted in overhead utility easements, causing electrical power outages, and offers solutions, both relative to infrastructure and to tree selection. Expected outcomes/impacts are the identification and removal of hazard trees from overhead utility easements and the selection and planting of more utility-compatible. While easy to identify these expected outcomes/impacts, they are more difficult to document due to the broad nature and audience for this program. A few cities in Virginia, however, have started to remove and replace said hazardous trees, with more interested in doing likewise.

Powell River Project

The Powell River Project (PRP) is cooperative program of Virginia Tech and the coal industry that conducts research and education programs to enhance the restoration and management of coal-mined lands. Research results are delivered to clientele (the coal industry, federal and state agencies charged with regulation of coal mining activities)through Cooperative Extension publications, and through education programs delivered at the PRP Research and Education Center -- an 1100 acre facility dedicated to the PRP's work and managed cooperatively by its owner, Penn Virginia Resource Partners LLC, and PRP / Virginia Tech -- by an area Extension agent (Jon Rockett) who is partially supported by PRP funds. The Center supports both long-term mine-restoration research, and field-based Extension education programs led by Rockett. The Powell River Project operates in close consultation with a Board of Directors, comprised coal industry representatives and funding supporters, Virginia Tech, and local educational entities. Board members help to identify program priorities, and mining firms represented on the Board provide funding. Mine reforestation procedures developed through Powell River Project research (James Burger, Forestry) are being used by the coal mining industry to increase timber productivity on restored mine sites. Results of research addressing management of mining and coal-combustion waste products (Lee Daniels, Crop and Soil Environmental Sciences) are being used by the Virginia coal industry to reduce environmental management costs while maintaining regulatory compliance, thus the Virginia coal industry's competitiveness in the global economy.

Evaluation of soil nitrate sampling and nitrogen rates for yield, quality and tobacco specific nitrosamine levels in burley tobacco

Burley tobacco requires high nitrogen rates to produce high yielding cured leaf. Rates differ across the burley region. In Virginia, growers are recommended to apply 175–225 pounds of nitrogen per acre. Some growers apply additional amounts of nitrogen as a side dress application. In seasons with high levels of rainfall most growers apply an additional 25-50 pounds of nitrogen by side dressing to compensate for nitrogen that may have leached below the root zone. This is generally based on rainfall precipitation and not soil type or actual nitrogen loss. In some instances growers apply excessive amounts of nitrogen resulting in poor cured leaf quality with no benefit to yield. Growers need the ability to make nitrogen application decisions based on

actual crop needs. Soil nitrate test have proven beneficial for determining the need of additional nitrogen in other row crops. If research could demonstrate at what soil nitrate levels additional nitrogen would be beneficial, growers could potentially use less nitrogen while maximizing yield and quality. A study was conducted to investigate three initial nitrogen rates plus three additional rates of nitrogen applied as a side dress application. The study was conducted as a randomized complete block design with a split-plot arrangement of treatments. Whole-plots will be the initial nitrogen rates of 80, 160, and 240 pounds per acre applied broadcast prior to transplanting. Sub-plots will be the additional nitrogen rates of 0, 50, and 100 pounds applied as a side dress treatment. Each treatment was replicated four times, for a total of thirty six plots. Treatments were evaluated for yield, quality and tobacco specific nitrosamines levels of the cured leaf. This project has been conducted in cooperation with Dr. Paul Denton with The University of Tennessee. Results of this project have been shared at field days, grower meetings, and agent in-service trainings. After one year of research across two locations the data shows potential for using soil nitrate sampling in making necessary additions of nitrogen to a burley tobacco crop is possible. The data also shows a correlation between nitrogen rates and TSNA levels in the cured leaf. The impact of this research and extension effort can be evaluated based on the number of actual nitrate samples taken for a given area. However, more data is necessary before making any recommendations on a grower level.

Chemistry, Bioavailability and Toxicity of Constituents in Residuals and Residual-treated Soils

The objectives of this research and extension workgroup are to evaluate and communicate: 1) the risk-based effects of residual application to uncontaminated soils on chemistry, bioavailability, and toxicity of nutrients and contaminants, 2) the ability of in situ treatment of contaminated soil with residuals to reduce chemical contaminant bioavailability and reduce toxicity, and 3) to predict the long-term bioavailability and toxicity of nutrients, trace elements, and organic constituents in residual-amended agricultural and contaminated soils. I have shared the results of this research with citizen groups, farmers, educators, and regulators via written and electronic educational materials, workshops, field days, and interaction on committees in the attempt to have environmentally sound management practices implemented. Outcomes are largely management and treatment recommendations conveyed to federal and state regulatory agencies to ensure that the practices do not have deleterious health and environmental effects.

Mid Atlantic Regional Water Quality Coordination Program

Extension specialists and researchers at mid Atlantic Land Grant Universities have been working with state and federal agencies and private individuals and foundations to develop written and electronic educational materials, conduct workshops, and provide input to regulatory committees for the improvement of surface and ground water quality impacted by agriculture. Outcomes are an integral part of the program goals. several of the most important outcomes include: 1) increased collaboration among regional partners, 2) securing increased project funding, 3) recognition of water quality as a regional priority, 4) our coordination group would be recognized as THE clearinghouse for science-based information, 5) there will be a focus of our program on under-served audiences, 6) we will provide leadership in training and educational programs, 7) we will integrate original research into our program, 8) we will identify issues as well as resources, and 9) we will integrate with national and other regional water quality programs.

Tree Fruit Pest Management
We examine plum curculios from states throughout eastern North America (VA, WV, NJ, MA, NC, SC, GA, FL) to determine more precisely the distribution of the plum curculio northern strain (1 generation annually) and the southern strain (2-3 generations annually). These strains meet in Virginia, and this project addresses an export issue for Virginia apples, since some countries use this species as a phytosanitary issue. A commercial tree fruit chemical control manual, a multi-state publication involving VA, WV and MD, is published as part of the project. This project is critical in enabling growers to produce fruit while minimizing injury by insects and diseases, especially internally feeding caterpillars. The project aids growers in pest management with the losses of critical pesticides resulting from FQPA. The project will aid in developing export markets for Virginia apples. At two of this winter's fruit schools, participants were surveyed on program impact. At the school in the main fruit producing region, comments included “As a result of this program, do you think you will make changes in the way you approach spray applications?” (Yes 20, No 5, Maybe 4, Already doing this 5) “As a result of this program, did you learn information about insects which you previously did not know?” (Yes 29, No 0, Maybe 1).

Turfgrass
Superior turfgrass cultivars that are adapted to the diverse climates of both VA and MD are identified. This enhances turf quality characteristics, as well as reduces likely inputs (fertilizers, pesticides, other maintenance requirements) in their management. Virginia Tech's turfgrass research team conducts simultaneous variety trials with the University of Maryland's turfgrass research team in the development of a list of "superior" turfgrasses for our two states. Each spring, university personnel and administrators from each state’s crop improvement association meet with the director of the National Turfgrass Evaluation Program (USDA) to review the previous list, the previous year's data, and to develop an updated list of recommended and promising varieties. This list is then published both in hard copy and to each units web address. This list is used extensively in the development of specifications for grassing by various contractors. The recommended cultivars are particularly adapted to lower turf maintenance situations that might be encountered in the management of under budgeted inner-city or rural-area athletic fields. Seed for most of these cultivars will still be competitively priced so that obtaining the grass is not impossible. Limited documentation is available, but it is known that many of the state's largest specialty turfgrass supply stores based their seed orders and recommendations on these grasses. As mentioned earlier, this list is also utilized by various local, state, and private groups that are developing bid specifications for turfgrasses at their facility. A limitation to our program is that most of the large lawn and garden retailers (Walmart, Lowe's, Home Depot, etc.) do not participate in the sale and marketing of these materials because they are distributing product on a national basis rather than a regional one.

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

The Economic and Psychological Determinants of Household Savings Behavior
The economic well being of families is of critical importance to the communities and states where they reside as well as the nation as a whole. There is "doubt as to whether the Social

Security Trust Fund will be able to pay full benefits to everyone as the Baby Boom generation retires. Employer and the government have shifted greater responsibility to individuals and families for funding retirement and health care. Households that lack savings can find it difficult, if not impossible, to achieve and maintain long-term financial stability. Without a cushion, households have little protection against the adverse effects of income loss due to unemployment, long-term illness, or disability or death of a primary income earner and may have to rely on extended family and forms of public assistance to survive. Insufficient saving savings can also have adverse consequences for the broader economic community. Home and business ownership, important elements of in the economic vitality of local communities, are difficult to achieve without savings. In times of economic downturn, loan default or bankruptcy become more likely to among those who have not been savers, shifting the burden of economic loss to the community." This is a direct quote from the Statement of Issue of the NC-1013 project. The objective of the research are to: 1. Develop an index of savings behavior that reflects a progressive journey from non-saver to saver, 2. Identify the specific factors that inhibit or motivate progress from non-saver to saver, 3. Evaluate the impact of both economic and psychological factors on both the index of savings behavior and the level of savings accumulated, controlling for differences in socio demographic characteristics and access to tax-advantaged saving vehicles, 4. Ascertain whether the relationships between the economic and psychological factors and savings behavior and level vary significantly by race and gender, and 5. Develop outreach materials based on the results of the study. The excepted outcomes for this project are: 1. An index of saving behavior, 2. Identification of factors that inhibit and motivate people moving along the index, 3. Identification of whether race and gender, in addition to economic and psychological factors affect movement along the index of savings behavior, and 4. Outreach materials to disseminate the findings along with research publications and presentations. The project is in the process of piloting the instruments so no impacts can be reported at this time.

Getting Rural Virginia Connected: A Vision for the Future

Rural communities traditionally lag behind the rest of the country terms of economic prosperity, literacy, and opportunities. The project presented a multi-faceted approach that included citizen leadership, community planning, economic development, and technology. Through this approach, communities were given the capacity to shape and direct their own futures. The US Department of Commerce NTIA (National Telecommunications and Information Administration) awarded a Technology Opportunities Program (TOP) grant to fund the proposal from the Blacksburg Electronic Village (BEV). The proposal called for the BEV to partner with Virginia Cooperative Extension (VCE) 'to help rural communities in Virginia develop the capacities needed to prosper in the Information Economy. These counties were spread from Virginia's Eastern Shore to its western border with Kentucky and included, from east to west, Accomack and Northampton (the Virginia Eastern Shore), King and Queen, Louisa, Cumberland, Craig, Carroll, Grayson and Dickenson. The Blacksburg Electronic Village (http://www.bev.net) was developed and has evolved in response to the needs of the community it serves. The basic idea was to let residents determine the challenges facing their communities and decide how to address them. Then, appropriate information and communications technologies already available through the BEV would be used to pursue community goals by facilitating exchanges of information and streamlining transactions among government and citizens, businesses and their customers, community organizations and their members, and

among citizens themselves. Virginia Cooperative Extension agents, having served and built their reputations in these communities, knew many of the issues first hand. They were therefore well positioned to bring all interested parties to the table. The Blacksburg Electronic Village, one of the oldest and most widely known community networks, would provide systems, training, and expertise in matters of deployment. The model called for the following: recruiting interested residents from each county, facilitating a community planning process (Take Charge), creating an Electronic Village in each county, performing technology assessments in each county, and developing a technology master plan for each county. While the funding has been completed, the project is ongoing in these communities through their continued use of the technology. Each participating community was given a copy of the final report and copies to present to their board of supervisors. In addition, counties continue to receive assistance with technical needs and community development needs. The project and final report are documented at http://top.bev.net Some of the outcomes from the project include: 1. Increased participation by a broad cross section of the community in decision making and consensus building, 2. A technology assessment and master plan was developed for each community, 3. Increased Internet usage in each county, 4. Increased opportunities for home based and micro businesses to establish a presence on the Web, 5. Increased opportunities for community organizations to use the Internet to provide publicity for themselves, 6. Fully functional community network using local members to manage content 7. BEV internship program, 8. Organization of Agritourism Business Opportunities Conference, and 9. Cashing in on Business Opportunities: Developing a Winning Business Plan.