

**Virginia Tech and Virginia State University
Agricultural Research and Extension
FY 2002 Annual Report of Accomplishments and Results**

The following is the Virginia Annual Report of Accomplishments and Results for 2002. The report includes the Agricultural Research and Extension programs at Virginia Tech and Virginia State University.

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A. Introduction

Mission

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

Vision

Building on the strength of our agriculture, natural resource, family and community heritage, we enable people to shape their futures through research based educational programs. Recognizing that knowledge is power, we serve people where they live and work. Audiences are involved in designing, implementing and evaluating needs-driven programs. We are a dynamic organization which stimulates positive personal and societal change leading to more productive lives, families, farms, and forests, as well as a better environment in urban and rural communities.

Our vision is:

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

Planning and Reporting Framework

Program Development. VCE addresses a broad range of problems and issues facing citizens of the Commonwealth through focused educational programming. This is accomplished and reported through VCE's Planning and Reporting system, which includes long range goals

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

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

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

The VCE strategic goals are:

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

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

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

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

- Reactions - Change in peoples' awareness and response to educational programming and information related to the problem.
- Knowledge or skill (K/S) change - Changes in peoples' knowledge, understanding, or abilities related to the problem.
- Practice change - Changes in peoples' behavior related to the problem.

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

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

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

Reporting Requirements

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

The State Summary Reports are developed from the individual reports.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Data Summary for 2001-2002 Programs

Based on data from the Planning and Reporting System, there were 4,765,325 contacts in VCE programs during the period July 1, 2001 through June 30, 2002. There were 600,726 extended learners who spent at least 4 hours (6 hours for 4-H membership) per year in a VCE educational

program. There were 46,556 volunteers assisting Extension staff in delivering these programs during the reporting period. These volunteers contributed 1,456,644 hours during the reporting period. Tables 1 presents a summary of contact and volunteer data by Extension program area.

**Table 1. 2001-2002 Contacts and Volunteer Data by Program Area
(July 1, 2001-June 30, 2002)**

Program Area	Total Contacts	%	Volunteers	%	Volunteer Time (hrs)	%
4-H	1,459,369	30.6%	26,636	57.2%	978,333	67.1%
Admin.	20,317	0.4%	67	0.1%	488	0.1%
ANR	1,972,998	41.4%	12,605	27.1%	378,288	26.0%
FCS	1,312,641	27.6%	7,248	15.6%	99,535	6.8%
Totals	4,765,325	100%	46,556	100%	1,456,644	100%

B. National Goals

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

Overview

Continued research (basic and applied) and extension activities in agricultural production systems are vital if the U.S. is to continue providing safe, nutritious and affordable food to consumers. Without such activities the U.S. can neither compete effectively for export markets nor achieve greater harmony between agriculture and the environment. Publicly funded food and agricultural research is needed what with private sector research largely devoted to new product development and proprietary issues.

Work in the Goal 1 area stretches across many themes from existing and emerging plant, animal, and human food borne diseases to improved technologies and practices for producers, processors, and consumers. These improved technologies are being designed to promote risk-reduction and nutrient-and natural resource-preservation.

Competitive farmers, ranchers and fishermen with adequate knowledge and tools can ensure that 1) livestock, dairy, poultry and seafood enterprises thrive; 2) consumers get safe and nutritious food; 3) animal health and well being is enhanced; and 4) wildlife benefit from improved animal health and enhanced environmental stewardship. Food animals, including aquacultural species, fare better in the care of knowledgeable producers and processors, allowing communities to reap financial rewards from animal-based food processing industries.

The investment in crop and plant research is another key to food security and is crucial to maintaining a diverse food and fiber supply. World population will double in the next 40 years. Most of the arable land is already under cultivation. To sustain high levels of production and ensure a healthy environment, agriculture will have to be profitable, environmentally sound, and research-based. Yield is subject to its own biologically imposed limits. Increased productivity depends more and more on genetic resources and biotechnology coupled with sustainable management practices to protect the environmental integrity of natural resources.

Some of the key issues important to achieving an agricultural production system that is highly competitive in the global economy include:

1. **Agricultural Genomics** to identify agriculturally significant genes to improve and diversify our crop, livestock, aquaculture, horticulture, and forestry products. The emerging field of bioinformatics is helping researchers analyze the large datasets of gene sequencing information;
2. **Value-Added and New Use Products** to maximize production output from existing and new agricultural products while reducing waste and preserving natural resources and wildlife habitats; and

3. **Environmental Stewardship** to improve current agricultural production practices, especially in animal production, air and water quality, forestry, and pest control. Achieving sustainable environmental and natural resources systems must be done in a way that is compatible with economic growth.
4. **Agricultural Security** - Acts of terrorism have heightened awareness of the need for security, both at home and on the farm or nursery. Virginia Cooperative Extension released five publications on farm security in 2002 as a beginning step in educating citizens about these threats. We must be willing and able to thwart probable threats to the world's future food and fiber systems. We must be wary of potentially pandemic diseases, unusual climatic conditions, and security threats of accidental or deliberate infection or contamination.

Finally, a number of non-researchable, albeit policy-based, issues are important as we move into this millennium. First is the need for continued public communication and outreach on agricultural production. We need to clearly articulate the value and importance of agricultural research to our economy and to society as a whole. As we do this, we must use modern information technologies to communicate this message to citizens. Further, the use of sophisticated decision support systems and information management systems will be vitally important as well as narrowing the "digital divide."

Key Themes

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 percent 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. Buyers of Virginia feeder cattle have expressed a preference in purchasing feeder cattle with known health and genetic background certified by a third party. Many Virginia producers believe there are long-term economic rewards in marketing feeder cattle with superior genetics and a preventative health program. There was a need to identify feeder cattle with improved genetic and health backgrounds as they entered the marketing process. A cooperative feeder cattle ear tag certification program involving the Virginia Cattlemen's Association, the Virginia-Maryland Regional College of Veterinary Medicine, and Virginia Cooperative Extension was initiated in July 1997. The Virginia Quality Assured Feeder Cattle program promotes the certification and identification of feeder cattle with superior genetic and health backgrounds as they enter the marketing process. Producers must participate in a beef quality assurance educational program before they are allowed to market cattle through the program. Ten beef quality assurance clinics were conducted utilizing exhibits

and presentations to explain the producers' impact upon beef quality and safety through genetic selection, management, and cow culling.

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 research 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. Supplementing the diet of weanling pigs with elevated levels of copper has the potential to reduce the need for use of antimicrobial feed additives. However, it appears that commercially available organic copper complexes may be fed at slightly lower levels than traditional copper sulfate with similar performance results and less copper excretion into the environment. The lower fiber content of hullless barley appears to result in higher digestibility and nutritional value for pigs relative to traditional hulled barley. Consequently less nutrient and dry matter excretion into the environment can be expected when using hullless barley as a primary feed ingredient as compared to hulled varieties.

Optimum Utilization of Forages and Underutilized By-Products by Ruminants. Efficiency of producing animal products is not optimum due, partly, to inefficient utilization of forages in production systems. Also, feeding excessive levels of certain nutrients or excessive soil application of animal wastes contribute to soil and water pollution. This project investigates methods to efficiently utilize forages in producing animal products, and strategies for reducing excessive nutrient contamination in soil and water by optimizing nutrient intake by cattle and soil application of nutrients. Different forage systems, including warm and cool season grasses and legumes, can be used successfully for beef cows and stockers. Supplementing limited amount of energy and protein enhance performance of weaned calves. Feeding or soil application of poultry litter does not increase P in soil or runoff water more than application of inorganic fertilizer.

Regulation of Feed Intake in Poultry. Various physiological mechanisms are responsible for controlling food intake in poultry. This project investigates the mechanisms whereby the brain controls food intake in birds selected for egg production or meat production. This research shows that selection for body weight alters the autonomic nervous system. Selection for increased body weight has caused an increase in the action of the parasympathetic nervous system that is generally associated with anabolic functions such as digestion and sleeping. In contrast, selection for decreased body weight has enhanced the function of the sympathetic nervous system that is generally associated with "fight or flight." Finally, the hypothalamic-pituitary axis is involved in food intake regulation as evidenced by the decrease in food intake caused by corticotropin-releasing factor.

Causes and Remediation Techniques for Poor Quality Poultry Muscle. The incorporation of pale, soft, and exudative meat in further processed poultry products results in reduced cook yield, insufficient meat binding, and a soft product texture with poor slicing ability. These products create economic losses for processors and customer dissatisfaction. Research involving diet alteration to improve meat quality, determination of bird susceptibility to PSE, determination of chilling rates on PSE development, and development of remediation techniques are all

imperative in solving or reducing the PSE problem. The impact is to reduce pale, soft, and exudative meat which could save an average sized poultry processing plant several million dollars a year determining the seasonal variation will allow processors to anticipate problems and establish remediation techniques (such as using high pH phosphates) for pale soft, and exudative meat. Also, results will allow live production personnel to decrease stress to the animals during times of peak meat quality problems.

Artificial Induction of Lactation to Extend Herd Life in Cattle. Thirty percent of lactating dairy cattle are culled annually, many because of breeding failure and failure to initiate a new lactation. This project will investigate various protocols to artificially induce lactation in nonbreeder dairy cattle, thereby extending productive life. The study investigates several protocols to develop a management system that dairy producers can use to induce renewed lactation in nonbreeding females to reduce herd culling losses and replacement costs. The advantage for the producer will be improved methods to induce lactation and rebreeding, which may facilitate retaining animals that would otherwise be culled from the dairy herd.

Survey of Immune Function in Herds of Normal Cattle, Sheep, and Horses. Factors such as age and stress have been shown to have a negative influence on animal health, resulting in interrupted growth and economic losses. There is a lack of available reference ranges for normal animals to evaluate bovine, ovine, and equine immune function. This study is establishing a normal reference range for three animal species with three age groups each. These results will provide an essential foundation for future projects to assess the impact of multiple factors on the immune system, and ultimately will benefit animal production. Variables that influence immune status have significant impact on animal growth, reproductive capabilities, and overall well-being. Establishing normal reference ranges serves as a starting point for examining effects of nutrition, management, and other environmental factors on immune status. Identifying factors that significantly alter immune function will provide valuable information that will lead to improve health, minimize diseases, and decrease the need for therapeutic (especially antimicrobial) intervention.

Aspects of Early Embryonic Development and Maintenance of Pregnancy in the Goat. This Virginia State University/Agriculture Research Service (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 producers' 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 serve to develop the methods to reduce embryonic mortality and boost producer income potentials. One referred article in the Journal of Animal Science was published in FY2002, and three (3) presentation at local, state, and national meetings of findings were produced.

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 traits. Three (3) refereed articles in the Journal of Animal Science were produced. Results were also presented at VSU's annual Agricultural Field Day with over 250 in attendance.

Agricultural Profitability

Warm Season Grasses. Virginia farmers almost every year observe a summer slump when high temperatures and small amounts of rainfall reduce the productivity both of cool-season forages and the animals that graze them. Researchers with the Virginia Agricultural Experiment Station have been studying the performance of several warm-season grasses under differing defoliation frequencies and at different sites in Virginia. The summer slump in animal performance can be exacerbated by the consumption of alkaloids present in endophyte-infected tall fescue – the primary forage base for forage-livestock systems in Virginia. Farmers need forage grasses that will thrive in the demanding summer climate of the Mid-Atlantic region. Researchers with the Virginia Agricultural Experiment Station have been studying the performance of several warm-season grasses under differing defoliation frequencies and at different sites in Virginia. In addition to estimating yields and seasonal distributions, they are studying nutritive value characteristics and digestibility of the different forages. Initial data has been presented at a national forum. Additional information will be provided to producers as data are generated. The data are being used to develop recommendations to farmers regarding choices of forages to plant for summer production. The information will be region-specific with respect to seasonal productivity, nutritive value characteristics, and response to different management regimes.

Nursery Stock Root Improvement. Nursery stock that is produced using many traditional production methods often performs below expectations and sometimes fails when planted in the landscape. Research and demonstrations have been conducted by Virginia Tech to evaluate and make recommendations relative to new commercially available root-modifying production methods and products. Nursery stock that is produced using many traditional production methods has a tendency to develop or maintain malformed or diminished root systems that may delay or prevent successful landscape establishment, or lead to plant failure later in the landscape. Pressure brought by the landscape installation/maintenance and urban tree care portions of the industry has prompted nurserymen to look for production methods and products that will modify or enhance nursery stock roots. Among this research has been evaluations of modified containers, hybrid container-field production systems, and various existing and potential root ball holding techniques. The results of these evaluations have been shown at field days at the center and the Virginia Nursery and Landscape Association, and presented at short courses and

seminars of the various Virginia regional nursery, landscape and grounds management associations, and at urban tree care programs. Multiple articles have also been published on the results, both in state publications and the national nursery trade publication NMPRO. More than one-half of Virginia's wholesale nurseries have adopted one or more of these root modifying or enhancing methods. Many of Virginia's landscape architects and urban foresters now specify, when appropriate, that trees to be installed come from one of these modified systems. Establishment success and long-term survivability of Virginia-grown nursery stock will increase in the future due to use of these improved production and holding techniques.

Integrated Management of Late Blight and Early Blight Diseases in Potato. Late blight and early blight are two important diseases that reduce potato production and quality. A new, more virulent strain of late blight first occurred in Virginia in 1995 affecting 20% of the potato acreage. The purpose of this project is to develop disease forecast systems for predicting presence of these diseases in potato fields, and to reduce the amount of fungicides required for control. Local potato growers were able to access both the Tomcast and Blitecast disease-forecasting programs by computer. Use of the disease forecasting software programs Tomcast and Blitecast for the management of early and late blight disease of potato can save area growers an estimated \$65 to \$75 per acre on fungicide costs and reduce chemical inputs by 30%.

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. "Site-specific" management for N fertilization for corn, wheat, and barley is leading to higher yields on soils with higher water-holding capacity, and reduced potential for leaching losses of N fertilizer on soils with low water-holding capacity.

Use and Safety of Biosolid Application. Virginia Tech and Virginia Cooperative Extension have published and disseminated education materials and have conducted education programs throughout the state to demonstrate the utility and safety of biosolids use. Virginia farmers who receive biosolids pay nothing for the valuable soil amendment and fertility source, and they save between \$60 and \$100 per acre on fertilizer and lime costs. Local governments depend on Extension advice to assist them with developing technically sound ordinances. Communities save the cost of landfill disposal or incineration of high quality biosolids. Virginia farmers who receive biosolids pay nothing for the valuable soil amendment and fertility source, and save between \$60 and \$100 per acre on fertilizer and lime costs. However, many Virginia counties are considering banning land application of biosolids because of the perception that the practice may impair soil and water quality and human health. The concerns of many citizens and local government officials have been alleviated to an important extent. Extension has provided technical assistance to local governments in developing ordinances that further ensure the protection of their citizens and the environment. This results in savings for farmers, who save on the cost of fertilizer and lime, as well as savings for the communities, which do not have to put the biosolids into a landfill or incinerator.

Managing Bedding Plant Growth with Plant Growth Regulators During Nursery Production. Annual and perennial bedding plants rapidly outgrow their containers during nursery production. Manual methods of controlling growth are labor-intensive and costly. The purpose of this project is to develop methods of controlling growth and maintaining quality of bedding plants during production with applications of chemical growth regulators. The information from these experiments provides guidelines for growers for controlling growth of perennials grown in large containers under nursery conditions. Possibilities for increasing flowering of slow-to-flower Camellia cultivars are also provided. Proper use of chemical growth regulators can improve plant quality and extend the marketing period.

Helping Farmers Meet the Requirements of the Food Quality Protection Act. One concern among farmers of the 1996 Food Quality Protection Act is that many of the old pesticides that this law eliminates or restricts will inhibit their ability to protect crops from pests and disease organisms. Virginia Tech has created six crop pest management profile fact sheets on Virginia's major fruit crops, and five additional crop profiles are under development. These fact sheets provide USDA with the means to develop transition strategies for Virginia farmers facing the regulatory impacts of the Food Quality Protection Act. These profiles are now being developed by all states. USDA was provided with the means to develop transition strategies for Virginia farmers facing the regulatory impacts of the Food Quality Protection Act. Virginia crop profiles are being developed to support those crops most vulnerable to the new regulation. The crop/pest management profiles are now being developed by all states. They are one of the main tools being used by the USDA Office of Pest Management Policy to work with the U.S. Environmental Protection Agency to reduce the potential negative impacts of the Food Quality Protection Act changes on agriculture.

Effects of Farm Spatial Attributes on Costs of Nonpoint Source Pollution Control. Costs of controlling nonpoint source pollution vary according to the economic and physical characteristics of farms and fields. This project develops decision aids that can be used to evaluate the costs of farm and watershed plans for controlling nutrient pollution. More effective spatial distribution of manure and commercial fertilizer nutrients among and within farms can increase the efficiency of nutrient use while maintaining or increasing farm profits and economic viability. More efficient crop nutrient use can reduce potential nutrient runoff and leaching which damage surface and groundwater.

Enhanced Biocontrol of Insect Pests in Limited Resource Greenhouses. Greenhouse production of vegetables provides an alternative source of income to small and limited resource farmers during the colder months. Insect pest control is a major problem. 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. The first year VSU/ARS project aims to address the greenhouse insect issues using biological controls. Three (3) 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.

Production of Vegetable Soybean for Direct Human Consumption. This second year 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 (3) presentations of project research findings were made at local, state and national meetings.

Nutritional Resources for Pollen Bees and Natural Enemies. In recent years, wild honey bee populations have been under stress and have declined to near zero in many locations due mostly to parasite mites. Bee keepers have resorted to continuous use of pesticides for mite control. However, resistance is developing and registration of new pesticides is slowed by concern over residues. The hive beetle, a predator of bee larvae, and the eventual arrival of “killer bees” could add additional costs to bee keepers. Pollination services are likely to become more expensive in coming years. The first year 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.

Diversified/Alternative Agriculture

Ginseng as an Alternative Crop. Virginia State University conducted a program for woodland owners to increase their income from American Ginseng. Applied research focused on 1) the economic costs and returns of wild-simulated American ginseng in Virginia 2) the growth requirements of American ginseng in regard to soil nutrients and site selection 3) the control of pests including slugs, voles and deer and 4) the control of human theft. Ginseng production research and demonstration plots have been established on more than 25 different farms in 20 counties of Virginia. Educational field programs have been held at these sites to teach landowners about this enterprise. Over 400 Virginia landowners have established production of American ginseng as a new enterprise for supplemental income. Most of these growers have started on a small, careful scale. The average level of production is only ¼ acre of ginseng. Average annual yield for these small-scale ginseng growers is about three pounds of dried roots. At \$400 per pound, that’s an additional \$1,200 in farm income per landowner.

Niche Marketing for Hydroponic Vegetables. Virginia farmers are constantly searching for new production systems, new enterprises and new ways of meeting ever-changing consumer needs. One promising area involves the niche market for hydroponic vegetable (without using soil) production in temperature-controlled greenhouses. These vegetables can be produced year-round, thus, extending the growing season for farmers and product availability for consumers. Virginia State University conducted applied research and educational programs on the production of hydroponic vegetables. Extension specialists are currently working with approximately 20 farmers engaged in hydroponic greenhouse vegetable production. They provide educational programs and individual consultation to farmers on all aspects of this high-tech industry from conceptualization through the sales of production. This includes assessing each farmer's individual needs, tailoring production to fit their needs and providing technical assistance when problems with insects and diseases arise. One hydroponic greenhouse tomato grower said he could earn just as much income from one 30 by 126-foot greenhouse as he could from 100 acres of soybeans. Virginia State University provided technical assistance and training to the Virginia Department of Corrections (DOC) in constructing its first hydroponic greenhouse in Dinwiddie. Last year, DOC built additional greenhouses, bringing the total to 15 in which they are growing tomatoes, lettuce, peppers and cucumbers to feed the inmate population.

Seedless Watermelon Production. Virginia State University continued applied research and educational programs on seedless watermelon production as an alternative enterprise for small and limited resource producers. Programs focused on the economic costs and returns, the effectiveness of chemical and non-chemical controls of weeds, insects and diseases, and the marketing procedures for selling seedless watermelons in both wholesale and retail marketing channels. Seedless watermelon plots were established on farms of cooperating farmers in Virginia to demonstrate crop production and marketing practices. Field Days were held at these demonstration sites to educate farmers on the enterprise. As a result of this educational program, an increasing number of farmers have included seedless watermelons in their enterprise mix.

Organic Agriculture

Production and Marketing of Natural Meats and Eggs. Over 50 farmers gathered at Brookview Farm in Goochland County to learn about production and marketing of natural meats and eggs at a field program jointly sponsored by the Virginia Association for Biological Farming and Virginia Cooperative Extension. The farm consists of 1200 acres, 600 of which are certified organic. The other 600 acres are leased from neighbors and managed organically even though those acres are not certified. The Field Day covered topics such as Conservation Reserve Enhancement Program (CREP), cost-share programs for fencing, watering and tree planting. Other topics included composting, appropriate technology for organic farming, preserving farmland from development, differences between agriculture zoning, agriculture districts and conservation easements, production and marketing of organic eggs, and production and marketing of organic beef. The farm sells 70% of the organic beef in traditional markets and 30% directly to the health food stores or directly to customers. Participants of the field day rated the program very useful.

Organic Agriculture as a Niche Market for Small Farmers. Applied research is being conducted at Virginia State University to promote organic agriculture as a niche market for small

farmers. Research is focused on determining economic costs and returns of organic vegetable production in Virginia, the effectiveness of non-chemical controls of insects and diseases in vegetable crop production, and the effectiveness of using cover crops, compost and other organic fertilizers to maintain soil fertility. Organic research and demonstration plots have been established at Virginia State University's Randolph Farm. Over 250 people attended the annual crop field day in August 2002. Additionally, 190 persons attended the Virginia Biological Farming Conference in 2002 to learn about production and marketing of organic crops and livestock. The program included sessions on sustainable livestock production, organic fruits and vegetables and biological control of insects and diseases. Participants' evaluations of the conference were excellent.

Aquaculture

Pond and Cage Aquaculture. Virginia State University continued to promote educational programming for pond and cage aquaculture for limited resource farmers, and expanded its Youth Aquaculture Program. More than 35 programs were conducted throughout Virginia on pond management, fish nutrition, alternative species, fish health, water quality, fish processing and other best pond management areas. Multiple workshops were held to promote environmentally sound aquatic weed control techniques. Virginia State University established demonstrations in hybrid striped bass to serve as learning centers for regional farmers.

Animal Health

Effects of Estrogenic Isoflavone on Immunity to Intracellular Infections. Environmental estrogens are suspected in reproductive disorders, increased rate of infections, cancer, and increased morbidity and mortality in wildlife. The potential economic cost due to environmental estrogen-induced reproductive and immune failure can be massive. This research project focuses on whether genistein, a prototype environmental estrogen found in a number of plants, affects the immune system. Environmental estrogens, such as genistein affect the immune system. An understanding of the immune changes induced by these chemicals is very important, since a modulated immune system has several adverse consequences. For example, a depressed immune system could lead to increased infections, impaired response to vaccines, increased incidence of cancer and other immune-related diseases and hence seriously affect the productivity.

Insulin-Like Growth Factor Transgenes and Mammary Development. In addition to the classic hormones affecting mammary development, it is increasing clear that several growth factors are also critical. The role of the insulin-like growth factor axis is the focus of this project and specifically the local mammary tissue production of this growth factor. This project is designed to study the effects of synthesis of recombinant IGF-I on mammary development and function in transgenic mice and in bovine mammary cell lines expressing the transgenes. IGF-I and its family of related proteins (IGFBP) and IGF-I receptor are clearly involved in regulation of mammary development and function. While animal studies must ultimately provide the validation for in vitro studies, use of our cell lines provide the opportunity to evaluate the impact of local expression of these proteins on mammary cell growth and biochemical regulation of IGF-I cell signaling.

Animal Genomics

Advanced QTL Analyses for Complex Traits in Pedigreed Populations with Application to Livestock. This project contributes to the goal of identifying some of the genes affecting traits of economic importance in livestock. Such traits (e.g. milk yield and composition of dairy cows or carcass traits in swine) are typically quantitative and complex, i.e. affected by multiple genes and environment. Identification of genes affecting quantitative, complex traits leads to a better understanding of the genetic basis and to more efficient manipulation of these traits needed for continued improvement of the productivity of livestock. Gene identification is based on two steps, linkage mapping which traces genes in current families, and linkage disequilibrium mapping which uses the history of a gene from the time the gene mutation occurred to the present. Here we develop appropriate statistical methods for both steps. Finally, marker assisted selection to estimate an individual's genetic value combines information from trait values (cows' milk production records) with information from genetic marker data. Genetic marker data are likely to be available only on current individuals (not on their ancestors) and only on elite animals (e.g. nucleus animals). Consequently, a genetic evaluation system, which predicts the genetic value of each individual available for selection, must combine individuals with and without genetic marker data, and such a system is being developed here. This research is developing statistical methods, which, in combination with suitable data and populations, can decrease the chromosomal region to which a gene is mapped in order to facilitate cloning of the causal gene. This is not possible with the current gene map resolution.

Biobased Products

Molecular Analysis of Bacterial Genes and Enzymes for the Production of Useful Chemicals. The use of petroleum as raw material for the production of fuels, chemicals and fertilizers is constrained by the supply of petroleum and is detrimental to the environment. In this project selected bacteria are examined for their ability to convert harvested plants into useful chemicals. Anaerobic bacteria grow in the absence of air and hence produce a variety of energy-rich chemicals such as n-butanol and isopropanol. These chemicals are commercially valuable as solvents, chemical feedstock, fuels or fuel additives. This project aims to improve the microbial conversion of sugars and starch into diverse and more valuable products.

Biobased Materials Help Reduce Carbon Dioxide Emissions. Societal concerns over rising carbon dioxide emissions, general environmental quality, and growing dependence on fossil resources have heightened industrial interest in technologies that use renewable biological resources and that mimic biological processes and products. With the help of the Center for Innovative Technology of Virginia, Virginia Tech has established a pilot facility to demonstrate the conversion of carbohydrate-rich harvesting and processing residues from agricultural and forest products operations, as well as waste paper, into fibers and chemicals. Fibers are used for structural board, reinforced thermoplastic composites, and even garments. Chemicals are transformed into biodegradable plastics and resins for use as adhesives and binders in construction, textile manufacturing, oil production, and printed circuit boards. The regeneration of cellulose (wood pulp) from solvents unknown 30 years ago has become an estimated 200 million-pound commercial practice in at least three countries, including the U.S. A new type of high-strength cellulose fiber is finding use in silk-like garments as well as in biodegradable

composites. Lignin, the natural glue that provides wood fibers with their strength and that is removed during papermaking, has become a 2 billion-pound global business worth \$180 million for products used in construction, textile manufacture, oil production and many other applications. The combination of abundant wood fibers and recycled plastics is the basis for a new industry manufacturing almost 1.5 billion pounds of non-conventional, reinforced thermoplastic composites. The performance (including its light weight), cost, and appeal of natural fibers is boosting the automotive industry's aspirations to construct vehicles in the future whose wood fiber content is at least five-times higher than the current level of about 30 pounds per car. Bio-based lightweight packaging materials from carbohydrate-rich wastes are designed to fit into a carbon dioxide-neutral life cycle, and they contribute to rolling back carbon dioxide emissions to pre-1990 levels in accordance with the Kyoto Agreements.

Plant Germplasm

Breeding and Genetics of Barley and Wheat 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. The primary goal of this project is to provide producers with wheat and barley varieties possessing superior end-use traits and resistance to pests. The goal of this breeding program is to develop small grain varieties providing growers and industry with unique and more competitive commodities. This is being achieved through the development of highly productive pest-resistant varieties possessing value-added end use traits such as hullless seed, white seed color, unique protein quality, low phytic acid content in barley, and imidazolinone tolerance in wheat.

Improving Genetic Potential for Yield and Quality of Soybeans. High yielding new soybean varieties with disease resistance and improved seed quality are needed to keep soybean production profitable and to meet market demands. This research project is developing soybean varieties that are well adapted to Virginia and surrounding states and possess resistance to viruses and soybean cyst nematode as well as improved quality traits such as low saturated fats (low palmitic acid), low rancidity-causing factors (low linolenic acid), higher protein and suitability for soyfood processing. Soybean oil with low palmitic acid (low saturated fat) is considered a healthier alternative to regular soybean oil. Oil with linolenic acid is more stable in storage. Both traits are considered desirable by food processors that use large amounts of soybean oil. Genetic resistance is the only practical way of controlling crop losses to viruses. The SMV resistant germplasm developed in this project will be of value to many other soybean breeders and ultimately will contribute to improved disease resistance in U.S. soybean cultivars.

Evaluation and Improvement of Lupin Germplasm for Development of Adapted Cultivars. This VSU/ARS project designed in FY2001 and begun implementation in FY2002 aims to develop local adapted cultivars to help to provide an alternate winter legume crop to enhance the farm economy that has recently been hurt due to the following wheat prices, reduce input costs on nitrogen fertilizers, and reduce pollution of Chesapeake Bay Watershed. Two (2) journal articles were produced, and research results were also provided at VSU's annual Agriculture Field Day.

Plant Production Efficiency

Dynamic Soybean Insect Management for Emerging Agricultural Technologies and

Variable Environments. Plant growth of double-drop soybean, which comprises two-thirds of the total acreage in Virginia, is limited by late planting. Leaf feeding insects may be causing a much larger yield loss than current thresholds indicate. Thresholds are being reevaluated. New research shows that total leaf area is highly related to yield and when measured, may be an effective way to determine if fields should be protected from further leaf loss, thereby improving soybean yields. An aphid pest, *Aphis glycines*, was discovered in 2000 in many mid-western states and western-most West Virginia. It is capable of causing significant yield reductions of up to 50 percent if infestations occur early and are left untreated. It was discovered in Virginia in 2001. *A. glycines* was present in 24 counties in Virginia. These surveys showed that infestations were most likely the result of adult migrations from northern and/or western states. Most fields had low populations and because they were infested late in the season, no yield loss occurred. *A. glycines* over winters on buckthorn species. Investigations showed that three native buckthorn species occur in Virginia, but are relatively rare and isolated to western mountain counties where soybean is not commonly cultivated.

Population Density and Spatial Pattern of Plant Pathogenic Fungi. Population densities and spatial patterns of plant pathogens and biological control agents may affect the level of plant disease in the field. The purpose of the project is to determine if high population densities and aggregated spatial patterns occur in the field for specific plant pathogens and biological control agents and how these factors affect the level of disease control or development. These results provide evidence that may reverse the thinking of researchers that incompatibility within the chestnut blight fungus is the major factor limiting biological control of chestnut blight with fungal viruses. Previous research at Virginia Tech stressed the importance of blight resistance in American chestnut. Restoration of American chestnut to economic importance in Virginia could result if viruses are utilized in an integrated program with blight resistance.

Inositol Phosphate Metabolism in Plants: Altering Plant Development, Stress

Response, Signaling, and Phosphate Availability. Inositol and inositol phosphates play many roles in plant growth and development. Inositol phosphates can also be considered environmental pollutants as they accumulate in soils and contribute to phosphorus pollution. This research utilizes a plant model system to develop tools for future manipulation of the inositol phosphates in crop plants. All organisms require the ability to respond to their environment in order to adapt and survive. Second messengers are molecules that allow individual cells within the organism to respond to signals generated outside of the cell. Plants in the field respond to a variety of signals such as drought, pests and pathogens. This work will help identify the molecular machinery that plants use to respond to these signals. The identification of new targets for modulating signal transduction may permit the engineering of transgenic plants with altered physiological responses.

Adjuvant-Herbicide-Plant Surface Interactions Affecting Herbicide Action, Fate, and

Selectivity. Weeds cause great economic losses in the U.S. Herbicides are essential tools in combating the problem but may cause environmental concerns. Goals are to improve efficiency at lower rates and to minimize their impact on the environment. Evaluate herbicide-adjuvant-

plant interactions that may influence herbicide deposition, uptake, fate, action, and selectivity. Determine sites and modifying effects of certain adjuvants on herbicidal action and plant response, including root exudation and allelopathy. Adjuvants are now required in virtually all herbicides, either in the formulated product, as a tank-mix additive, or both. Optimizing their use in combination can improve herbicide efficacy, reduce the dosage required (therefore, environmental impact), and lower production costs. This research indicates that some proprietary herbicide formulations are already "optimized" for many common uses, in which case additional tank-mix adjuvants are an unnecessary extra expense.

Comparative Morphology and Host Response of Root-Knot Nematodes. Root-knot nematodes are the most important group of plant parasitic nematodes that cause significant economic injury to more than 2,000 host plant species. Root-knot nematode species are quite variable in their ability to attack various host plants. This research project is to identify morphological characters that are useful in the identification of the most common species. The project identifies and quantifies the variability that root-knot nematodes exhibit in their ability to parasitize various host plant species. The southern root-knot nematode is the most common Meloidogyne species in the southeastern United States, as well as, the semi-tropical and tropical countries of the world. Meloidogyne incognita occurs as four distinct host races and two cytological races that are morphologically similar. This study supports that maintenance of all of these forms as a single species, M. incognita.

Biosynthesis of Biological Iron-Sulfur Clusters. Chemical structures containing iron and sulfur (iron sulfur clusters) are required for the life-sustaining processes of respiration, photosynthesis, and nitrogen fixation. The purpose of this project is to determine how cells activate inorganic forms of iron and sulfur to form biologically active iron-sulfur clusters. Under study are two gene products, NifS and NifU, that separately bind sulfur and iron and then establish a complex that permits the formation of an iron-sulfur cluster unit. These enzymes can now be targeted to effect or control the specific activation or inactivation of essential cellular processes. The agronomic significance of such an approach could involve the design of altered metabolic pathways for increased crop yield, resistance of crops to certain stress conditions, or the prevention or treatment of microbial pathogenesis.

Chemical Thinning of Apple. The major cullage factor for apples is inadequate fruit size. Cost of hand thinning may vary from \$500-1500/acre, and thus is considered prohibitive. Over-cropping greatly increases the number of small fruit, reduces the next season's return bloom, and reduces crop value. This project determines the potential effects of low light and night temperatures on natural fruit set and effectiveness of chemicals used for fruit thinning. A better understanding of chemical thinner interaction with light and temperature may lead to optimizing crop load and higher crop values. Chemical thinning sprays are used commercially to reduce crop load early in the season, to achieve marketable fruit size, to promote adequate return bloom, and to maintain tree structure. Caustic fertilizers, surfactants, and desiccants applied in bloom were found to interfere with pollination of flowers thus cause early fruit abscission. In addition plant growth regulators were found to cause fruit abscission within the 30 days after bloom. Multiple factors are involved in adjustment of the proper crop load.

The Role and Regulation of HMG-CoA Reductase in Plant Disease Resistance. New strategies for plant disease resistance are important for the long-term sustainability of crop production. The purpose of this study is to enhance understanding of the molecular and cellular basis of plant disease resistance and to use this knowledge to engineering novel defense strategies. These studies on HMGR and phytoalexins synthesis have led to new understanding of the molecular and cellular mechanisms controlling key metabolic responses that mediate disease resistance. This knowledge has served as the basis for designing novel strategies for enhanced disease resistance and may be important for metabolic engineering strategies for manipulating bioproduction of key isoprenoid products.

Agricultural Competitiveness

Computer Classroom on Wheels. Many farm managers are not using basic business management techniques in their day-to-day management practices. The Computer Classroom on Wheels program teaches farm managers to use computers for such applications as record keeping, marketing on the Internet, and making business decisions. Virginia Cooperative Extension has provided workshops to more than 2,000 farm managers in 140 locations in Virginia since 1994. Classes taught by Virginia Cooperative Extension farm management specialists and agents include introductory, intermediate, and advanced farm record keeping and analysis; spreadsheet applications; and introduction to the Internet. About two-thirds of workshop participants in recent years reported they use computers often or almost always to keep farm business records and for business management. Computers are used for such things as business record keeping, payroll, financial management, and crop record keeping. Some participants reported they had increased or decreased farm enterprises as a result of participating in the workshops. Others used their new mastery over information to make business decisions based on "what-if" questions, with computer programs showing them the probable impact of management decisions on their operations. About one in five of the participants say the workshops have allowed them to tap the power of the Internet to benefit their farm businesses.

Biotechnology

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

Genetic Study of Wood Formation. Studying wood formation in trees is difficult due to the large size of trees and the long period they need to reach maturity. Researchers with the Virginia Agricultural Experiment Station have developed a plant genetic model based on Arabidopsis thaliana to study wood formation. Arabidopsis, a mustard plant whose life cycle can be studied

in three months, is now recognized as an excellent model for testing the impact of foreign genes on the quality and quantity of woody tissue. This research is expected to eventually lead to the development of genetically modified trees whose qualities for specific purposes are scientifically maximized. Researchers at Virginia Tech associated with the Virginia Agricultural Experiment Station have developed a genetic model from A. thaliana, a member of the mustard family of plants, for studying wood formation. The genome of Arabidopsis has been entirely sequenced in an international scientific project, and it offers a model for studying the more complex genomes of other species. The Virginia Tech researchers have characterized several genes that are expressed specifically in wood, and they are currently studying the regulatory mechanisms that control gene expression in wood. Due to the methodology developed at Virginia Tech, Arabidopsis is now recognized as an excellent model for testing the impact of foreign genes on the quality and quantity of woody tissue produce by plants. This is because transformation and evaluation of transgenic Arabidopsis can be completed in approximately six months compared to some transgenic trees that require years to fully evaluate. This research is expected to eventually lead to the development of genetically modified trees whose qualities for specific purposes are scientifically maximized.

Molecular Modeling of Ligand Binding to Retinoic Acid Receptors. Many observations of reproductive and developmental problems in humans and in wildlife are being attributed to endocrine disruption, a process in which chemicals in the environment mimic or antagonize the effects of normal hormones. The purpose of this study is to develop a better understanding of the interactions between hormones and the protein receptors through which they act. A strong association has been made between synthetic chemical contaminants in the environment (e.g., dioxins, PCBs, and some pesticides) and adverse effects on a variety of wildlife species and possibly humans. Through this research we will gain better understanding of how these chemicals interact with proteins known to affect gene expression by binding to DNA.

Soybean Crop Improvement – Genetic Engineering Approach to Increasing Phosphorus Utilization. Phytic acid content of plant seeds used as animal feed components results in poor phosphorus availability and the potential for environmental phosphorus pollution of critical watersheds. This project addresses approaches to lowering phytic acid content by introducing genes for degradative enzymes or by blocking the biosynthesis of phytic acid. The manipulation of soybeans to reduce phytic acid content in seeds will help enhance nutrient utilization and reduce the environmental phosphorus pollution resulting from intensive livestock production.

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	125.9	6.8	0.0	0.4	16.0	0.0
2004	125.9	6.8	0.0	0.4	16.0	0.0

Research SY's Only

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

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

Overview

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 faculty have played a major role in developing internationally adopted principles and conducting training programs for producing safe food products. These principles which are called the Hazard Analysis Critical Control Points system (HACCP), Safe Quality Food (SQF) and good agricultural practices (GAPs) serve as a basis for processors and regulatory agencies to identify hazards in producing foods, establishing critical control points in processing for hazard control and monitoring for assuring product safety. Research programs have addressed and will continue to address the sources and incidence of food borne pathogens in ecosystems, ecology of microorganisms, processing techniques to eliminate or reduce pathogens, environmental effects on virulence and infectivity of food borne pathogens, development of procedures to prevent pathogen contamination, and management practices.

Food safety is addressed by extension through workshops with agents, farmers, producers, processors, distributors, retailers and consumers. In addition, extension personnel work directly with each clientele group on food safety issues. During fiscal year 2002, 28,680 clientele were contacted through educational programs on food safety conducted by Extension Agents and Specialists. Our undergraduate and graduate students are taught the principles of food safety in most classes including: food microbiology, food processing, advances in food microbiology, dairy processing, quality assurance, poultry processing, veterinary toxicology, (nearly all food animal veterinary courses have a food safety component) and many others. The Virginia-Maryland College of Veterinary Medicine has research, teaching and extension programs that ensure that animals entering the food supply are free of disease. The animals may still harbor organisms that are pathogenic to humans including *Salmonellae*, *Cryptosporidium*, *E. coli* O157:H7 and others. Programs are ongoing to develop better detection systems and ways to treat animals harboring pathogens. Food Science and Technology examines food safety issues during processing and develops intervention systems. This department has an active extension program to train processors, distributors, federal, state and local government inspectors, and others. Collaboration 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.

Food safety is an issue that affects everyone and must address issues from farm to table. Target audiences include students (undergraduate and graduate), producers, processors, distributors, extension agents, retailers, consumers and federal food inspectors. In addition, extension personnel work directly with each clientele group on food safety issues. University students are taught the principles of food safety in various classes. Extension personnel will continue to develop workshops to train target audiences. Successful state programs will continue to be

expanded to national audiences. We will continue to work with national organizations to insure consistency of delivery materials.

Key Themes

Foodborne Illness

Foodborne illness can result from the consumption of ready-to-eat foods such as uncured cooked turkey breast that has been contaminated with pathogens such as *Clostridium botulinum* or *Listeria monocytogenes*. A study conducted by Virginia Tech scientists showed that both *Clostridium botulinum* and *Listeria monocytogenes*, if present in uncured cooked turkey breast, could grow under both temperature abuse and extended refrigeration conditions. The product may be hazardous even though there is no off-odor associated with the turkey breast at time of consumption. Proper refrigeration and avoidance of extended storage time are important for product safety.

Improperly formulated and/or processed canned foods present an important food borne illness risk. As a result, stringent regulations are required for canned food producers. Through the Acidified Foods Testing Program conducted by Virginia Cooperative Extension, over 74 products produced by acidified foods manufacturers in the Commonwealth were evaluated. Thirty-seven individual food processors were assisted with product formulation and regulatory compliance toward the goal of reducing the rates of food borne illnesses.

Food Handling

Safety of food is a critical issue for consumers and food crop producers. Maintaining the microbiological safety of horticultural produce requires vigilance from the farm to the table. A new program conducted by Virginia Cooperative Extension on Good Agricultural Practices (GAPs) provided training material for local agents to disperse into the farming community to assist growers of horticultural food products to institute and maintain safe production and handling practices. Twenty-five agents were trained in an extended fall 2001 workshop on the principles of GAPs, and 400 growers were introduced to the concept during 30 to 60 minute sessions in winter grower educational meetings and pesticide applicator training sessions. Follow-up surveys indicated strong grower interest in extended GAPs workshops and development of a state certification program for GAPs.

Food Safety

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. A Virginia Cooperative Extension Specialist provided fish processing firms with information on sanitation chemicals and programs to reduce the presence of disease and spoilage

microorganisms in their facilities. As a result of the program, fresh scombroid and scombroid-like fish products should be introduced into the market that are safe and wholesome.

A Virginia Tech scientist showed that the use of alternative anti-microbial and surfactant chemical sprays for pre-chiller chicken carcasses can decrease the incidence or concentration of pathogens on these carcasses. Reduced pathogen levels on raw meat can lead to fewer food borne illnesses attributed to poultry consumption. Environmental (air) sampling for *Campylobacter jejuni* may be an effective, non-invasive method for detecting and quantifying this pathogen in infected chicken and turkey flocks. Interventions to inactivate airborne *Campylobacter* or to limit the spread of the organism through the air could lead to reducing the prevalence and concentration of *Campylobacter* in processed poultry.

Due to the rapid nature of microwave heating, the microbiological safety of foods prepared in the microwave oven has been in question for several years. Research has demonstrated that pathogenic bacteria can survive in microwave oven-prepared foods. Foods are heated from the inside out and are strictly governed by their own internal properties such as ionic content, moisture level, fat level and specific heat. A Virginia Tech project will lead to improved cooking processes and cooking instructions for inactivating pathogenic bacteria in frozen or thawed ground beef formulated with different fat contents.

Virginia Cooperative Extension Specialists prepared a training manual and presented a one-day workshop addressing the scientific and practical "hands-on" aspects of crabmeat pasteurization for five crab processing companies' employees and 11 state Shellfish Sanitation inspection officials. A pasteurization manual was prepared and distributed to the participants. The information in the manual was presented and discussed with the participants. The lectures addressed scientific issues such as basic seafood microbiology, seafood safety, F values, pasteurization procedures, can seam tear down requirements, record keeping, etc. The "hands-on" section of the workshop allowed the participants to practice with vacuum packaging equipment, can seam tear down equipment and techniques, and temperature recording procedures. This workshop provided essential training for the crab processing industry and for the state regulatory officials responsible for ensuring that pasteurized crabmeat products are safe and wholesome. The information provided in the workshop will allow both the industry and the regulatory agency to have a better understanding of the critical control points associated with pasteurization. Such information will help ensure that Virginia pasteurized crab meat is safe and wholesome.

Thirty-five apple cider processors in three states received updates on alternative processing techniques for fresh juices developed by Virginia Cooperative Extension. Three of these processors reported that they are using ultraviolet treatment of fresh juices as the processing technique to meet Food and Drug Administration regulations.

Food Quality

The economic viability of the Virginia crab-processing industry is under tremendous pressure from high quality imported crabmeat. Imported crabmeat accounts for more than 65% of product sold in the U.S. To help enhance profitability, the domestic crab processing industry in

Virginia is forming alliances and repacking foreign crabmeat during the off-season. The Virginia Department of Shellfish Sanitation requires that all repacked imported crabmeat undergo microbiological testing (i.e., aerobic plate counts and fecal and total coliforms) and sensory evaluations. During 2001, the Virginia Seafood Agricultural Research and Extension Center received pasteurized crabmeat samples from eight crab processing companies in Virginia. These eight companies represent the largest crab processing companies in the State. Over 200 crabmeat samples representing approximately 800 analyses were processed. These sensory and microbiological analyses enabled these companies to repack and sell imported crabmeat products in Virginia. As a result, these companies continued to generate revenue during the off-season and were more profitable.

Approximately 90 youth gained hands-on experience in safe cattle handling and the concepts of beef quality assurance through participation in the statewide Youth Cattle Working competition conducted at the Virginia Beef Expo by Virginia Cooperative Extension Beef Cattle Specialists.

HACCP

Within Virginia, poultry are the leading agricultural commodity with a value of approximately 800 million dollars per year. Since poultry processing and production is a significant portion of the Virginia economy, it is imperative that efforts are made to maintain or improve the safety and quality of poultry products, and enhance compliance with many recently enacted federal regulations. A Virginia Cooperative Extension Specialist worked with the Virginia Poultry Federation to conduct bi-monthly seminars or workshops on technical and regulatory issues, including Hazard Analysis and Critical Control Point (HACCP) program training. During the past year, more than 220 personnel from processing companies in western Virginia and nearby states attended these meetings along with regulatory and trade association representatives. These efforts have enhanced the understanding and implementation of practices to improve the microbiological safety and quality of chicken and turkey products from Virginia processors, and enabled processors to readily comply with HACCP regulations.

Numerous medical device manufacturing firms suggested the seafood HACCP (Hazard Analysis and Critical Control Point) manual produced by Virginia Tech and four other Land-Grant Universities should be revised for application in their industry. A meeting was held with representatives of the medical device manufacturing industry, U. S. Food and Drug administration and Virginia Tech and the result was the production of a two-day curriculum, an accompanying text, and appropriate audio-visuals. Forty-one courses have been presented to 1,161 attendees on the application of HACCP principles as a risk assessment and risk management tool. Because of the success of the program, a formal organization was formed, the Medical Device HACCP Alliance, and a Virginia Tech Extension employee has been elected as the organization's first Chairperson. The Alliance is sponsored the First International Symposium on Risk Management Implementation for Healthcare Products in June, 2002.

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	11.4	0.0	0.0	0.0	0.0	0.0
2004	11.4	0.0	0.0	0.0	0.0	0.0

Research SY's Only

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

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

Overview

Cancer, cardiovascular disease, diabetes mellitus, elevated blood pressure, and obesity, major contributors to the growing health care expenditures in the United States, can be prevented or ameliorated by a well chosen and appropriate diet. Major goals for both education and research in the past fiscal year have centered on 1) ensuring access to a safe and nutritious food supply; 2) determining the biological role of food components that exert a positive impact on health; and 3) motivating individuals of all ages to select a nutritious diet optimum in quantity and quality from available food choices.

Ensuring access to a safe and nutritious food supply. In recent years major nutrition discoveries have centered on plant foods and the chemicals present in plants (phytochemicals) that have health-related properties. Foods researchers have partnered with horticultural specialists to develop edible protein coatings that will extend the shelf life of fruits and vegetables and reduce spoilage and waste, thus saving money for the consumer and increasing profits for the farmer. Efforts to elucidate the mechanism controlling the secretion of fat globules in milk formation may enable producers to control the amount of fat occurring naturally in milk, making this nutrient-rich food more acceptable for individuals controlling their intake of saturated fat. Health educators are encouraging the public to increase their intakes of fish which tend to be lower in saturated fatty acids and higher in polyunsaturated fatty acids known to reduce cardiovascular risk. Current research is evaluating the levels of pesticides and other chemical residues found in fish and seeking ways to reduce the accumulation of such compounds during processing and storage. These issues are important to the health of consumers and the economic well being of families deriving their livelihood from the fishing industry.

Determining the biological role of food components that exert a positive impact on health. Naturally occurring antioxidants in food supply appear to support the action of mitochondria and other cellular proteins that may help protect against the deleterious effect of environmental toxins. Environmental hazards such as ultraviolet light or overexposure to insecticides may increase the risk of cancer or neurological diseases such as Parkinson's disease, respectively. An understanding of these relationships that will contribute to the development of intervention strategies are current areas of inquiry. Limited food intake as occurs among young women who are chronic dieters may exert a toll on bone health, and a controlled study is now underway to evaluate this situation.

Motivating individuals of all ages to select a nutritious diet. Nutrition and health education programs directed at all age levels have enabled learners to participate in group settings, receive individual instruction as part of the Expanded Food and Nutrition Education Program (EFNEP) or Smart Choices Nutrition Education Program (SCNEP), or study at home with the use of newsletters, videos, or other materials. Educational goals focused on practical knowledge that enabled recipients to adopt more healthy food patterns regardless of their income level or available resources. Nutrition principles have focused on the importance of plant foods including fruits and vegetables (5 A Day) and whole grains, reducing dietary fat, especially saturated fat, and lowering sodium intake. Training for day care providers led to changes in both

the food items served to young children and the foods eaten by this age group. Intergenerational programs in which senior adults taught nutrition to at-risk preschoolers brought about positive changes in the diets of not only the senior mentors and the participating children, but also the parents and families of these children. Development of nutrition and health lessons within the framework of the Virginia Standards of Learning (SOLs) allowed Virginia Cooperative Extension agents to reach several thousand children on school time in addition to those from limited resource families participating in EFNEP and SCNEP 4-H programs. These lessons led to positive changes in nutrition knowledge and food behavior.

Both younger adults attending weight control classes at their worksites and senior adults participating in nutrition and fitness classes at congregate meal sites adopted more healthful eating and exercise patterns. Limited resource families demonstrated not only increased levels of nutrient intake following their enrollment in EFNEP or SCNEP, but also an improvement in food management practices such that they were better able to utilize the food stamps or food vouchers they received and were more food secure.

Adoption of safe food handling practices and appropriate hand-washing techniques were observed in food service workers completing food safety training. Participating were workers responsible for the safety of preschool and school-age children, members of community and civic groups serving meals on an occasional basis, food vendors, and food managers successfully completing the ServSafe National Restaurant Association food safety certification class.

Internal and External Linkages. Food and nutrition education and health promotion programs delivered in this reporting year emphasized a partnering relationship with both private and public agencies. Nutrition, food safety, and disease prevention lessons developed by Virginia Cooperative Extension, meeting at least one of the Virginia SOLs, made possible continuing collaboration with local school systems. Curriculum focusing on healthy eating is being implemented at the six 4-H educational centers in the State, and on-campus specialists are providing assistance in developing menus and selecting recipes for the camp food service program. Classes held at noon in business and industry settings reached clientele who, because of time or transportation problems, would not attend evening meetings. In cooperation with the Virginia Area Agencies on Aging, classes at congregate meal sites and senior centers reached elders with age-appropriate curriculum on nutrient needs, health benefits of foods in particular food groups, cancer prevention, osteoporosis prevention, cooking for one or two, and prudent use of supplements.

Partnerships with the Virginia Department of Social Services led to cooperative efforts to strengthen community systems serving limited-resource families and to provide direct education to these families in the areas of nutrition, lifestyle choices, and personal health care. Family and Consumer Sciences and Community Initiatives (FCS & CI) agents and specialists have established collaborative activities with faculty from the College of Agriculture and Life Sciences to address food and nutrition issues receiving national attention. Efforts of the Virginia Small Grains Board and Extension specialists from the Department of Crop and Soil Environmental Sciences have made possible the development of publications for both children and adults that point to the benefits of grain foods, particularly foods and recipes containing Virginia wheat and barley. Investigators from the Department of Horticulture and the

Department of Human Nutrition, Foods and Exercise (HNFE) are working on the development of edible coatings to lengthen the shelf life of fresh fruits and vegetables and increase the profitability of Virginia fruit and vegetable growers.

Scope of Impact. Despite the loss of 20 FCS & CI county faculty as a result of budget reductions necessitated by the economic slowdown in Virginia, many citizens were reached across the Commonwealth. Close to seventeen thousand Virginians (16,742), from preschoolers to senior adults, participated in nutrition and health education programs through face-to-face programs or learn-at-home materials. These efforts were supported by 773 volunteers who contributed 8,410 volunteer hours and in-kind services valued at over \$168,000 (\$20 per hour). Nutrition and Wellness field faculty secured \$64,021 of external funds to enhance nutrition education programming efforts. A total of 4.2 FTEs was devoted to food safety education and training, reaching a total of 3,989 extended learners. Assisting with food safety education were 207 volunteers who provided 3,876 hours of work.

Key Themes

Human Health

Several chronic health problems including heart disease, cancer, and obesity are associated with both diet and lifestyle patterns such as level of physical activity and use of tobacco. The growing prevalence of these chronic conditions continues to impact upon national and state health care costs and leads to a diminished quality of life for many citizens. Of particular concern is the growing prevalence of obesity and other chronic health problems such as diabetes and elevated blood lipids among children and youth. Both education programs and research projects in human health addressed the dietary patterns, food components, and lifestyle interventions that are associated with weight management and reduction of chronic disease risk including lowering dietary fat and increasing dietary fiber and phytochemicals. Food-borne illness continues to be a risk for persons of all ages, but can be especially dangerous for the preschool population, senior adults, and those with a compromised immune system. Environmental pollution and contaminants and their impact on human health continue to be a critical area of investigation.

Health Education for Preschool Audiences

Increasing numbers of preschoolers are receiving the majority of their weekday meals from day care providers who also influence their level of physical activity during most of their waking hours. With childhood obesity becoming one of the fastest growing problems in our nation, 10 programs were offered across Fluvanna County to raise awareness of this problem and potential interventions. Approximately 145 day care providers, Head Start directors, and parents participated. As a result of these programs, providers indicated that they are serving more nutritious meals reflecting the Dietary Guidelines for Americans, and have increased the time devoted to active play for their children.

Six lessons from the “Heart Power” series were offered to Head Start classes enrolling 47 four- and five-year-olds in three rural counties in Northwest Virginia. Lessons focused on nutrition,

the importance of physical activity, and avoidance of tobacco use. Pre- and post-surveys indicated that 93% of the children could recognize healthy versus unhealthy lifestyle choices.

Following a seminar on Safety on the Playground, 26 child care providers indicated knowledge of and improved practices in health and safety when selecting playground equipment and supervising play.

Health Education for Youth Audiences

Tobacco education is an important component of health education for middle school youth. About 670 5th, 6th, and 7th graders participated in a poster and essay contest on reasons why they should not start smoking. Follow-up data relating to smoking prevalence in this population is being collected.

Fifty-nine females (ages 10 to 17), considered at high risk for a teen pregnancy, participated in a year-long program consisting of esteem-building activities and community service projects. None of the teen participants became pregnant during the duration of the program.

Health Education for Adult Audiences

Diabetes mellitus, if poorly managed, contributes to the severity of other chronic problems and a deteriorating quality of life. "Dining with Diabetes" is a lesson series designed to assist diabetic patients with meal planning and food selection compatible with the dietary prescription received from a health care professional. Of sixteen African-American adults completing the series, 97% reported an increase in nutrition knowledge. Seventy-nine percent of the participants were able to identify foods high in saturated fat, and 65% were knowledgeable regarding the baking properties and potential uses of artificial sweeteners.

Three hundred fifty-seven adults in Mecklenberg County participated in classes on the Dietary Guidelines for Americans and dietary prevention of cancer and heart disease. Pre- and post-surveys revealed that 61% of those attending the "Fighting Cancer With Your Fork" series increased their knowledge of foods that may help to prevent cancer, and 35% indicated they had changed their dietary behavior to 1) increase their number of servings and variety of fruits and vegetables to at least five a day; 2) decrease their total dietary fat; and 3) increase their servings of whole grain foods. Among the senior adults enrolled in the "Aging Well with Good Nutrition Series," 43% increased their overall nutrition knowledge, while 22% adopted at least two of the recommended practices including increasing fruits and vegetables to five per day, decreasing intake of sodium, decreasing intake of fat, and decreasing calorie intake to control body weight.

The "Change of Heart" newsletter series offers an opportunity for adults to learn at home. Among one population of 42 adults in a rural county in central Virginia, 86% reported they were choosing lean meat, poultry, and fish; 81% were reading food labels to determine the cholesterol content of processed food; and 76% were substituting low fat cheese or skim milk for whole milk products when preparing food. Among another subscriber group, 61% (65 of 106) noted that as a result of the information they received from the newsletters, they made at least one change in their choice of food to reduce their risk of heart disease.

Weight management programs addressing the public health problem of weight gain in the general population were offered in several settings. Weight management programs emphasize positive food and lifestyle patterns and prevention of further weight gain, and are replacing the traditional weight loss programs which focus solely on weight loss. Weekly healthy weight groups were formed in two counties in central Virginia as a result of community needs assessments and requests. Fifty persons participated over a period of 6 months with approximately 25 attending regularly. A follow-up survey reported 28 behavioral changes among participants including increased fiber intake, increased physical activity, and increased water consumption. Most had made some progress toward their weight management goal, with one person losing 20 pounds. The success of the program in creating a positive attitude toward lifelong weight management was indicated by the comment of one participant who stated “For the first time, a program is placing more of an emphasis on what you do eat, rather than on what you have to give up.” In a volunteer-led weight management course offered at noon in a work setting, 100% of participants indicated they had made positive dietary changes based on the educational lessons received. Fifteen participants reported a weight loss that totaled 85 pounds.

Chronic dieting, resulting in inadequate nutrients for optimal bone health, is a common practice among young adult women. The impact of this practice on bone mass, especially among those young women who may still be forming bone mass, is unclear. This study is evaluating the impact of chronic dieting on bone mineral density among otherwise healthy young adult women, while controlling for body mass and physical activity. In that low bone mass leads to bone fractures and disability in later life, it is important to provide health professionals with a perspective on this potential problem and a basis for developing an intervention program.

Adults limiting their use of red meat in an effort to control their intakes of cholesterol and saturated fats may be compromising their mineral status, as red meat is an excellent source of bioavailable iron, zinc, and copper. This may be of particular concern for women who have lower energy intakes, and, during the child-bearing years, an elevated need for iron. This project will evaluate the effect in women of red meat on blood cholesterol and lipid levels and iron, zinc, and copper status when consumed within dietary guidelines using the Food Guide Pyramid. These results will provide information as to the ability of women to use beef in their daily diet to provide important minerals, without adversely affecting blood lipid concentrations. Nutrition and health professionals can use these findings to develop appropriate education programs for the public.

Air Quality and Environmental Health

Use of certain cleaners and other chemicals in the home contributes to deterioration of indoor air quality. Among 45 participants enrolled in a Chesterfield County Healthy Indoor Air Quality Workshop, 100% were able to identify potentially hazardous products that affect indoor air quality, and 82% intended to implement safe practices with such household products.

Chemicals in the environment such as dioxins, PCBs and some pesticides can mimic or antagonize the effects of normal hormones (endocrine disruption) with detrimental effects on both wildlife species and possibly humans. An on-going research project will improve our

understanding of how these chemicals interact with protein receptors and bind to DNA, thus influencing gene expression.

Exposure to pesticides may influence human health in respect to brain chemistry and brain function. Epidemiological evidence suggests a linkage between exposure to insecticides and incidence of Parkinson's disease. A current study is examining the possible effects of insecticides on brain cells and brain chemistry with comparisons to those changes commonly observed in Parkinson's disease.

Biogenic amines are naturally-occurring antinutrition factors that have been implicated in several episodes of food poisoning. Their concentration in finfish species has been suggested as a possible standard of quality and safety. At this time limited information is available concerning the normal concentrations of these compounds in major finfish species or the effects of storage conditions and processing variables on their production. It is important that these concentrations be determined, to ensure that state and federal food regulatory agencies do not establish unrealistically low action levels, leading to unnecessary product loss, litigation, and financial consequences to both fishermen and processors. Industry processors have been informed of sanitation chemicals and programs that can reduce the presence of disease and spoilage microorganisms in packing and storage facilities and thus preserve fish safety and quality. As a result of this program, fresh scombroid and scrombroid-like fish products are being introduced into the market that are safe and wholesome.

Depletion of the ozone has increased exposure to ultraviolet (UV) light which generates harmful changes in the genetic code. These changes lead to errors in DNA duplication, the formation of useless or harmful proteins, and cell changes that encourage formation of a cancer. Some organisms have a specialized enzyme called photolyase that can reverse UV-induced DNA damage associated with skin cancer. Unfortunately, photolyase is not found in humans. The goals of this research are to understand the reactions of photolyase and subsequently develop a photolyase treatment for humans.

Cockroach infestation of human dwellings carries grave consequences as these pests may transmit pathogenic organisms and can promote serious asthma reactions. Unfortunately, cockroaches have developed resistance to many current control methods; thus, new studies are evaluating the respiratory and water balance mechanisms of the German cockroach oothecae as a basis for developing new management strategies. Knowledge of the basic biology of *H. axyridis* could decrease the role of the beetle as a seasonal urban pest, while at the same time contributing to its more efficient use in integrated pest management.

Human Nutrition

The primary objective of the human nutrition education program is to increase dietary intake of fruits, vegetables, and whole grains to meet the intake goals outlined in the Food Guide Pyramid. Nutrition education programs took a lifecycle approach reaching all age groups from preschoolers to senior adults. A unique emphasis has been the development of intergenerational nutrition programs by which senior adults teach nutrition to preschoolers in day care settings, supporting both adult and child development. Research in human nutrition has looked at the

action of food components in maintaining optimum nutritional status and preventing chronic disease.

Nutrition Education in Preschool Audiences

Kindergarten settings provide excellent opportunities for reaching preschool children in rural areas. In one rural county 128 children participated in the “Let’s Start Eating Smart” program. All children ate at least one new fruit or vegetable as part of the program, and teachers reported that they consumed more fruits and vegetables after the program was completed.

The “Building Strong Bones, Building Strong Families” program in another rural county reached 288 pre-kindergarten students. It was reported that 100% of the children tried a calcium-rich food that they had not tasted before, and the proportion of children eating the recommended number of servings of foods from the Milk Group increased from 16% to 58%. Another favorable outcome reported by teachers was an increase in the number of calcium-rich foods served at school functions.

Nutrition Education in Youth Programs

Food and nutrition education programs that meet the Virginia Standards of Learning (SOLs) in science and health, have enabled field faculty to offer food and nutrition instruction as part of the school class day. A School Nutrition Education Series consisting of four, 45-minute lessons was taught to 1,633 second and third graders in 16 schools in six rural counties in Southwest Virginia (Giles, Montgomery, Patrick, Carroll, Floyd, and Pulaski). Two lessons focused on increasing use of fruits, vegetables and whole grains, one lesson addressed the importance of reading labels to determine the nutrient content of processed foods, and one lesson considered the need to increase calcium intake. Cumulative results indicated that 74% of the students tried at least one new food, 70% had begun to read food labels, 78% consumed more milk, and 74% increased the number of fruits and vegetables eaten each day. Teacher evaluations documented improvements in students’ nutrition knowledge, but more importantly, the positive changes in eating behavior.

Public school programs have enabled field faculty to reach underserved audiences. A “Food Fundamentals” nutrition program delivered to 62 youth in Prince Edward County that included a high proportion of African-Americans demonstrated impact on both knowledge and behavior. This program included food safety content as well as simple food calculations that incorporated math skills. Evaluations indicated that 100% improved their food preparation skill (scoring 5 on a 5 point scale); 90% were able to use proper measuring techniques; 94% knew the proper tools for measurement; 85% could use labels to learn food content; 87% improved their basic math skills; 77% could now read and follow directions for food preparation; and 93% increased their frequency of hand-washing. In a school program reaching 243 youth, 86% of the parents responding indicated their children not only increased their knowledge of the Food Guide Pyramid but also improved their eating habits. Thirty-six percent reported that many of their children’s food habits had changed and 36% reported that some of their children’s food habits had changed.

The 4-H Smart Choices Nutrition Education Program, directed toward limited-resource populations, operated in 16 Virginia counties reaching 7,201 youth, and resulting in a caseload of

774 youth per program assistant. The Summer Food Service Program was conducted at 56 sites and enrolled 1,682 youth. Pre- and post-program evaluations conducted with 3,487 youth from 153 groups indicated improved dietary behavior. Fifty-seven percent reported eating a greater variety of foods, 59% increased their ability to select low-cost foods high in nutritional value, and 76% improved their practices in food preparation and food safety.

Nutrition Education for Adults

Materials specifically directed toward the unique nutrition needs and problems of senior adults (As You Age series) led to increased programming efforts with this age group. A nutrition series was conducted with 151 senior adults in York County. A follow-up survey to which 115 of the seniors responded indicated that 70% had made two or more positive changes in their food behavior by increasing their intakes of fruits, vegetables, grains, and/or milk products. Among 96 senior adults participating in a similar program in Frederick County, 90% of the participants reported an increased intake of fruits, vegetables, or milk on the pre- and post-survey. In the Roanoke Valley 230 senior adults were reached with this program. Upon follow-up, 95% indicated they had learned important nutrition information, and 65% indicated they would make positive changes to their diet as a direct result of the classes.

Nutrition Education for Intergenerational Audiences (Preschool and Senior Adult).

In three rural counties in Northwest Virginia, 81 at-risk 4-year-olds and 74 at-risk senior adults participated in the “Healthy You” intergenerational nutrition program which emphasizes the health benefits of fruits and vegetables for both children and adults. The primary goals were to 1) introduce preschoolers to fruits and vegetables; 2) help children understand the relationship between good food and health; and 3) provide the opportunity for the children to interact with a positive older adult role model. Parents were involved using newsletters sent to the home, workshops, and, in some cases, enrollment in the Smart Choices Nutrition Education Program. The senior adults, recruited from Area Agency on Aging nutrition meal sites, were trained to mentor and teach simple nutrition concepts to preschoolers and contributed a total of 2,368 volunteer hours. More than \$5,900 in donations was secured from the community to cover expenses incurred as part of the senior mentoring program. Follow-up evaluation with parents indicated that 93% of the participating children were able to distinguish fruits and vegetables from other foods; 86% of the families were trying new fruits; 68% of the families were trying new vegetables; and 93% of the families were including fruits and vegetables in their diets each day.

An intergenerational program (the Planning Healthy, Nutritious, and Safe Meals series) in York County involved 209 day care providers, Head Start teachers, and foster grandparents. A post-survey six months following program completion indicated that 72% of the adults increased their consumption of fruits and vegetables by two servings and adjusted portion sizes according to the Food Guide Pyramid.

Expanded Food and Nutrition Education Program (EFNEP). The Virginia Expanded Food and Nutrition Education Program (EFNEP) promoted management practices that increased cost-effectiveness and the number of families served with the resources available. Marketing and recruitment strategies designed to appeal to young, limited-resource families resulted in the

achievement of recommended caseloads of eligible adult participants, an average of 152 families per program assistant. Six hundred and thirty-nine volunteers were recruited and trained, resulting in the contribution of 4.6 FTEs of time working with program assistants in implementing adult food and nutrition education lessons. The majority of homemakers (71%) were taught in groups, whereas 23% were taught individually, and 5% were taught using a combination of group and individual sessions. Extended learners, those homemakers receiving a minimum of four hours of instruction, represented 3,915 families, with a potential for improving the nutrition and physical well being of 13,366 family members. Of the 3,915 Virginia homemakers meeting the criteria for extended learners, 1,650 completed the entire series of EFNEP lessons (8-12). Agents and program assistants were able to generate \$21,747 from community sources to support local program activities.

An educational goal of the EFNEP program is to bring about improvement in the food and nutrient intake of limited-resource homemakers and their families. Across Virginia 42% of the limited-resource homemakers (1,894 of the 3,915) met objectives for graduation from the program by improving their intake of food groups in the Food Guide Pyramid and raising their intakes of five key nutrients – vitamins A and C, calcium, iron, and fiber. Among the 1,650 homemakers completing the entire series of lessons, the Bread/Cereals group increased by 1.1 servings per day, the Fruit group by 1 serving per day, the Vegetable group by 1.2 servings per day, and the Milk/Cheese/Yogurt group by 0.60 serving per day, representing significant increases over preprogram levels. Overall, 95% of homemakers participating in EFNEP made an improvement in at least one food group. Intakes of critical nutrients including iron and calcium and vitamins A, C, and B-6 increased substantially, with intakes falling below 75% of the Dietary Reference Intakes (DRI) at entry and exceeding 75% of the DRI at exit. Although not statistically significant, this outcome is of physiologic importance, as experts consider intakes equal to 75% of the DRI as the minimum threshold for health and well being. Mean dietary fiber intake increased from 11 grams per day to 15.5 grams per day, a 41% increase. The current minimum suggested intake of fiber is 20 grams per day.

Food security looms as an important issue for limited-resource families. Based on improved food management skills arising from EFNEP participation, 89% of graduates (representing 1,469 families) reported running out of food before the end of the month less often, planning meals ahead more often, and using labels to help choose healthy foods. By graduation from the program, 1,419 homemakers (86%) reported more frequently comparing food prices, using grocery lists, and having enough food to last for the entire month. Improved shopping and management skills also allowed better use of food resources obtained from food stamps (1,867 EFNEP families) and food vouchers from the Women-Infant-Children Supplementary Food Program (WIC) serving 2,203 EFNEP families.

Health and food safety practices also improved as a result of EFNEP lessons. Over half (55%) of program graduates reported choosing and preparing foods lower in sodium and fat, reading nutrition labels, and eating breakfast. Seventy-one percent (1,171 homemakers) began using recommended practices in thawing and storing foods properly.

Smart Choices Nutrition Education Program (SCNEP). The Smart Choices Nutrition Education Program (SCNEP) successfully recruited limited-resource individuals and families to

achieve average caseloads of 230 households per FTE of program assistant time. The number of volunteers recruited (1,484) contributed a total of 9.8 FTEs of time working with program assistants in implementing adult food and nutrition lessons. Eighty-five percent of homemakers were taught in groups, 13% received individual lessons in their home, and 2% were taught using self-administered video lessons. The number of extended learners included 6,835 adults and 7,201 youth, for a total of 14,036, with potential positive effects on the diet and health of 22,783 family members. About 50% of these families received food stamps. Total external dollars generated by this program exceeded \$3,000,000.

Statewide 3,277 adults graduated from the program after completing 8 to 10 lessons. Objectives for graduation include improving intake of food groups in the Food Guide Pyramid, and raising dietary levels of five key nutrients – vitamins A and C, calcium, iron, and fiber. Forty-eight percent of participating limited-resource adults achieved these objectives. Intakes of iron and calcium and vitamins A, C, and B-6 increased by at least 5 to 10% from program entry to exit, and fiber intake increased by about 2 grams per day (a 19% increase in mean intake).

About half of SCNEP graduates (representing 1,475 families) improved in food security practices, reporting running out of food before the end of the month less often, planning meals ahead more often, and using labels to help choose healthy foods. By graduation and exit from the program, 62% (2,043) of adults compared food prices and used grocery lists. Improved shopping and management skills also allowed better use of food stamps by 7,000 households and WIC food vouchers by 807 families. Improvements in food resource management skills as a result of SCNEP likely increased the federal and state government investments in these programs designed to increase food buying power.

As a result of SCNEP lessons, 86% of graduates (2,818 adults) adopted acceptable food safety practices in thawing and storing foods correctly, and 40% of graduates (1,311 adults) reported choosing and preparing foods lower in sodium and fat, reading nutrition labels, and eating breakfast within two hours of getting out of bed. Encouraging limited-resource families to garden has implications for improving nutrient intake; among the 416 homemakers who started a vegetable garden, mean vegetable intake increased by one serving per day whereas homemakers who did not garden increased their intake by only 0.3 serving.

Prevention of Food-Borne Illness

Knowledge of food safety and the implementation of appropriate food safety practices is integral to prevention of food borne illness in the home and the success of tourism-related food businesses across the Commonwealth. Virginia Cooperative Extension offers several levels of food safety training: 1) the ServSafe course which on successful completion of the required examination results in certification by the National Restaurant Association; 2) food safety workshops for food service workers; and 3) the Occasional Quantity Cooks class for organizations and entrepreneurs serving food at local events. Of the 750 students enrolling in the ServSafe course, 85% (638) received passing scores leading to their certification by the National Restaurant Association. Eight hundred thirty-seven individuals completed the Occasional Quantity Cooks course and knowledge scores recorded on pre- and post-tests indicated an increase in mean scores from 20% to 76%.

A partnership between Virginia Cooperative Extension and the New River Valley Health District was established so that temporary food vendors such as those participating in local fairs who complete the Occasional Quantity Cooks course are not inspected by the local Health Department before commencing operations. This certification is valid for three years.

Five community organizations observed at community events demonstrated positive changes in food handling practices following completion of the Occasional Quantity Cooks training. Members now wear hair protection, thermometers are used regularly to check food temperatures, and hand-washing stations are utilized.

In Planning District 10 Occasional Quantity Cooks classes enrolled 117 individuals and the renewal class enrolled 55, representing 85 civic and nonprofit groups. Because of this training, the local health departments witnessed a big improvement in food safety standards at temporary food events held in that jurisdiction.

Safe food handling and preparation procedures were demonstrated to 28 low income, mentally challenged minority youth and their five counselors. Following the class, nineteen (61%) of the youth understood that bacteria is the main cause of food-borne illness. Follow-up observation revealed that all participants were washing their hands correctly 75% of the time.

As part of a Starting a Food Processing Business Seminar in a rural, economically depressed region in Southwest Virginia, 100% of participants (8), increased their knowledge of standardizing and manufacturing food products.

Sixteen food service workers with limited literacy skills successfully completed an introductory food safety course in preparation for the National Restaurant Association's ServeSafe food certification course. Each has been matched with a mentor to assist with their reading and comprehension when enrolled in the food certification program.

Virginia Cooperative Extension, in cooperation with a local school district, trained 23 school cafeteria food service workers in food safety. A follow-up survey (16 workers responded) indicated that 100% will use cooling and storage methods that minimize risk, while 87% will use holding and reheating methods that minimize risk. Ninety-four percent of the workers shared their learnings with others.

Of the 140 persons completing the Applied Food Service Sanitation class in Orange County, 28 were inmates in corrections facilities that were to be released in the near future. The four ex-offenders who settled in the Charlottesville area and were available for follow-up all found full time employment in food service within one week of release.

Ensuring A Safe and Healthy Food Supply. Poultry products provide an excellent source of high quality protein while limiting dietary intake of total and saturated fat. Pale, soft, and exudative (PSE) meat has detrimental effects upon processed poultry products including reduced cooked yield, poor binding, and soft texture with poor slicing ability, resulting in customer dissatisfaction. These meat characteristics also result in millions of dollars of losses for poultry processors. Current research is evaluating dietary alterations that may improve meat quality and

reduce the amount of PSE meat contained on the carcass. Remediation techniques will allow poultry processors to reduce the impact of PSE meat in poultry product production when it does occur. Stress on animals during periods of peak meat production also may influence meat quality.

Increasing evidence suggests that a consistent intake of five or more fruits and vegetables a day lowers the risk of several chronic diseases including cancer, stroke, and heart disease. The relatively short shelf life of fresh produce, however, presents a problem for consumers and results in substantial financial losses for growers. An edible bilayer protein coating that will help to preserve quality characteristics of taste and texture and increase shelf life is being developed and evaluated. Apple firmness and texture play an important role in the overall sensory evaluation of this fruit and standardization of these criteria will enable further testing and application important to this industry.

Calcium, highly bioavailable from dairy products, is known to exert a powerful effect in the prevention of debilitating bone disease in later life and may play a role in controlling blood pressure. Unfortunately, many individuals avoid dairy products in an effort to reduce their intake of saturated fat. Current work is evaluating the factors that regulate the secretion of milk fat globules by milk-secreting cells and the role of specific proteins that appear to participate in this process. The potential importance of this work is that it may lead to methods by which the secretion of fat globules, and, thus, the amount of fat formed in milk could be controlled. Identification of milk lipid globule membrane proteins will also improve our understanding of why lipid globules behave as they do during processing operations.

Nutraceuticals

Harmful oxidants present in some foods, in water supplies, and in the environment contribute to human conditions such as aging, heart disease, cancer, cataracts, and possibly Alzheimers disease. Naturally occurring substances in food can act as antioxidants and prevent or reverse the chemical changes in tissues that result from oxidants and harmful environmental conditions. Using an animal model, this study is evaluating the effects of food antioxidant substances on cellular mitochondria. It is believed that specific mitochondrial proteins help protect the body against the harmful effects of oxidants. These results may be used to help design diet and supplement patterns that will facilitate health.

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	26.3	0.4	0.0	52.1	0.0	0.0
2004	26.3	0.4	0.0	52.1	0.0	0.0

Research SY's Only

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

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

Overview

Water quality, particularly as it relates to sediment, nutrient, pathogen, and chemical pollution of groundwater, streams, and waterways, is a major concern at both the State and national levels. In Virginia and other mid-Atlantic states, the restoration of the Chesapeake Bay has been a major area of focus since the mid-1980's. The Chesapeake Bay is North America's largest and most biologically diverse estuary, and is home to more than 3,600 species of plants, fish and animals. In June 2000, the states of Virginia, Maryland, Pennsylvania, and the District of Columbia signed the Chesapeake 2000 agreement, which established a partnership to further restore and protect the Chesapeake Bay.

Virginia Cooperative Extension educational programs on the conservation, protection, and stewardship of Virginia's land and water resources are conducted by Extension Specialists at Virginia Tech and Virginia State University, and by Extension Agents in 107 county and city offices. Water quality educational programs concentrate primarily on non-point source pollution in agricultural and urban and residential environments. In fiscal year 2002, Virginia Cooperative Extension Agents and Specialists made 143,187 face-to-face contacts related to water quality educational programs.

Many different strategies and applications of new technologies are necessary to accomplish the overall goal of achieving greater harmony between agricultural and forestry operations and the environment. Long-term field monitoring efforts will continue to be used to assess the effect of land use on both ground and surface water quality. Dependable information from such field studies is essential to develop best management practices (BMPs) which reduce non-point source (NPS) pollution. Over the years, many BMPs have been developed. Selected examples include the following: (a) integrated pest management, (b) animal waste control structures, (c) buffer strip cropping, (d) grass filter strips, (e) no-till crop production systems, (f) stream protection, (g) nutrient management, (h) storm water retention ponds, and (i) constructed wetlands.

Numerous factors such as land use, climatic conditions, soil conditions, and geographic conditions influence the effectiveness of BMPs. Appropriate procedures for evaluating BMPs must be developed. One obvious approach would be to conduct full-scale field studies to accomplish this goal. Small-scale studies with rainfall simulators have also been used to approach the same goal. These experimental approaches are generally expensive because of the time and labor involved. One cost-effective way of accomplishing the same goal is to use mathematical models to evaluate different BMPs. This approach has been used successfully in the past under different situations. However, the success of this approach will depend heavily on the availability of realistic mathematical models to represent the system. Therefore, efforts will continue to improve existing models and to develop new approaches.

Management of wastes from intensive production and processing facilities will continue to play an important role in advancing greater harmony between agricultural and forestry operations and the environment. While developing new and more effective management technologies, research on the utilization of this waste as a nutrient source for crop production and converting it into

revenue generating by-products will also continue. Research to minimize both the quantity and potency of waste through dietary changes in animal diets will continue.

A key principle of sustainability is to recycle renewable resources and minimize the use of nonrenewable resources. Modern commercial agriculture has been dependent on petroleum-based sources of nitrogen and mined and industrially processed sources of other nutrients to increase the fertility of its soils. Recycling of organic wastes onto soils may improve the soil chemical, physical and biological properties, which increase soil productivity and enhance environmental quality.

Major emphasis in recent years has been placed on teaching and encouraging farmers to utilize wastes as fertilizer. As profit margins stagnate, or become smaller, there is a need to develop treatment and handling alternatives that convert wastes into profitable by-products.

Odors from livestock farms often create major conflicts between farmers and their urban and suburban neighbors. Because of the likely odor conflict between livestock production and non-farming neighbors, zoning authorities are increasingly considering imposition of significant setbacks for large production systems from neighboring residences and developments. Farmers are often unable to meet these requirements, and are frequently hindered in assembling economically viable livestock growing operations because of possible odor generation. Methods of treating and managing agricultural wastes are needed to allow farming and other neighbors to satisfactorily coexist.

Producers of food and fiber must be educated to facilitate voluntary adoption of BMPs. This educational effort will be most effective if carried out through a variety of means including publications, which are an important mechanism for disseminating information. Media opportunities must also be utilized to the fullest extent possible. In addition, field days and innovative demonstrations are needed to get improved methods into practice. In order to gain initial participation, workshops, demonstrations, and field days will be widely advertised well in advance of the offering. Programs which allow a participant to “buy-in”, such as water testing opportunities and Farm*A*Syst, will be especially effective.

Federal, state, private and nonprofit agencies will be involved in the planing and implementation of projects. Such agencies will include, USDA's Natural Resources Conservation Service (NRCS), Virginia Department of Environmental Quality (DEQ), and Virginia Department of Agriculture and Consumer Services (VDACS). Internally, project objectives will be implemented in collaboration with Cooperative Extension and the Experiment Station. The NRCS provides expertise and material support in all phases of project implementation. State agencies such as DEQ and VDACS participate in prioritizing research, provide technical assistance and cooperate in developing research proposals.

Key Themes

Integrated Pest Management

Corn earworm is the most damaging insect pest of soybean in Virginia and annually attacks fields destroying pods and reducing yields. Not all fields are attacked each year and growers are encouraged to implement the Virginia Cooperative Extension Corn Earworm Advisory program to identify which fields need protection. In 2000 and 2001, growers and their crop advisors used the advisory on more than 53 percent of the total soybean acreage to determine if enough corn earworms were present to justify insecticide treatments. Corn earworm populations were 'mild' and as a result, statewide, only 6 and 7.8 percent of the total soybean acreage for 2000 and 2001, respectively, had to be treated with insecticide, compared with 57 percent in 1999. This translated to an estimated 500,000 fewer acres being treated during the last two growing seasons, and at an average cost of \$10 per acre for an insecticide application, an estimated overall cost savings of over \$4 million.

During the Essex Area Field Day (45 in attendance), Virginia Cooperative Extension Agents discussed soybean insects and provided a scouting demonstration. Soybean producers continue to use this technique to determine the need to spray insecticides to control corn earworms in soybeans. As indicated by scouting, insect pressure was low in 2001, and less than 500 acres were treated.

Through Virginia Cooperative Extension programs on IPM practices and forecasting tools, soybean producers in Westmoreland County treated zero acres of the 2001 soybean crop for corn earworm saving treatment costs(\$12/acre) on 19,500 acres of soybeans.

Results of a three-year glandular-haired alfalfa variety trial conducted by Virginia Tech indicated that although potato leafhopper numbers were slightly reduced, glandular-haired varieties have a lower yield potential compared to standard varieties and may not be economically feasible for Virginia growers. This information will allow Virginia growers to avoid paying the \$35 per acre premium on glandular-haired alfalfa seed.

A 350-acre small grain producer in Middlesex County learned scouting procedures for small grains through Virginia Cooperative Extension. After assisting the producer in scouting fields and calculating the added expense of fungicide application, the producer made a "non spray" decision that saved him over \$7,000.00 in additional production costs.

The School IPM program is designed to train Virginia public schools on how to upgrade their pest management practices, with a goal of eliminating calendar-based insecticide applications and replacing them with pest prevention methods and monitoring. Funding for the IPM program was obtained from the Virginia IPM program, the Virginia Environmental Endowment, the Virginia Pest Management Association, and the Virginia Department of Agriculture and Consumer Services Pesticide Control Board. The School IPM program focuses on training 3 client groups: Virginia Cooperative Extension agents, pest management professionals and school personnel. Since 2001, 10 training workshops have been conducted for public school superintendents, school facilities staff, and their contract pest management professionals.

Virginia Cooperative Extension weather-based advisories were accessed a total of 1867 times on the worldwide web from June to October 2001. The Virginia leaf spot advisory saved three sprays of fungicide compared to a total of seven sprays on a 14-day schedule as prescribed in many states. At an average cost of \$13 per acre for each application, the advisory saved peanut growers \$2.9 million dollars in production of 74,000 acres of peanuts in 2001. Sclerotinia blight advisories warned growers of weather and plant growth conditions that would trigger disease onset. These warnings were generally 3 to 5 days in advance of disease outbreaks, and enabled application of fungicide before the crop was damaged. Frost advisories were issued from September 25 until October 30 in 2001 in cooperation with Dr. Dave Walker, Chief Meteorologist at NBC affiliate WFMJ-TV in Youngstown, Ohio. These advisories enabled growers to avoid penalties for freeze damage to kernels. Without freeze damage, Virginia-type peanuts had a value of \$603/ton in the fall of 2001. Freeze damage would have reduced this value to \$422/ton on deliveries of up to 25% of a grower's quota production.

Land Use

Chesapeake has lost 23% of its farmland to development since 1964. That trend threatens the future of agriculture in Chesapeake. City Council took the initiative in 2000 to appointment a local committee to study the topic and make recommendations whether agriculture could and should be preserved with local government involvement. A Virginia Cooperative Extension Agent made fifteen presentations to citizens about the value agriculture plays in the local economy and the indirect benefits to city government from maintaining agricultural land use. Surveys from 754 citizens who participated in the surveys revealed 87.5% agreed or strongly agreed farmland, natural areas and historic sites are a part of our heritage and should be protected. Surveys also indicated 89.8% of citizens agreed or strongly agreed agriculture should continue as the largest user of land in Chesapeake in the next 20 years. Chesapeake is currently drafting its comprehensive plan and will use this information to make decisions about the future of its agricultural industry.

In 1998 Virginia Tech's College of Natural Resources and Virginia Cooperative Extension began working cooperatively with The Nature Conservancy in Southwest Virginia, in support of the fledgling Forest Conservation Bank Project. Virginia Tech conducted survey research of forest owners in southwest Virginia, as well as economic analyses of the proposed Forest Conservation Bank and a series of public education programs. The Forest Bank, now called the Forest Conservation Program, is operational, and a letter of intent has now been signed for the inaugural property, a 5,300 acre tract in Russell and Washington counties. The intent of the Program is to insure sustainable forestry is practiced on the land, and future subdivision or development for nonagricultural or forestry uses is prohibited.

Natural Resources Management. Logging contractors must obtain compliance agreements and other paperwork to legally transport wood products out of the Federal Gypsy Moth Quarantine Area. Loggers without proper paperwork are subject to fines, impoundment, and/or load rejection. To help loggers obtain the necessary paperwork, Virginia Cooperative Extension developed a new logger education program entitled "Gypsy Moth Self-Inspection Certification for Loggers." Overall, 142 loggers participated in four training sessions. By late-fall 2001, a total of 89 logging contractors and companies had requested compliance agreements from the

Virginia Department of Agriculture and Consumer Services. In addition, offering the training in the form of an educational program resulted in many loggers being trained at once, thereby increasing the effectiveness and reducing travel costs for USDA-APHIS and VDACS personnel.

Since October 1997, 1,624 individuals (90 percent are private forest landowners) have attended and completed a short course in the Virginia Forest Landowner Education Program (VFLEP), with leadership provided by Virginia Cooperative Extension. Through this program, each landowner has completed 12 hours of classroom instruction on sustainable forestry practices. Eighty percent of these landowners stated that material learned during a VFLEP short course would enable them to earn an average additional \$11,000 from their woodlands. This represents a potential income gain of over \$16 million.

Nutrient Management. With the increased need for environmental compliance, a proactive approach to nutrient management is essential. Virginia Cooperative Extension worked with fifteen Franklin County dairy herds to collect manure, soil, feed, and milk samples for analysis for nitrogen, phosphorus and other essential nutrients. All fifteen herds obtained a Certified Nutrient Management plan as a result of these analyses. Ten herds made nutritional changes and reduced phosphorus excretion into the environment. Three of those herds reduced their fertilizer costs as a result of manure and soil test results. The nutrient management plans will help these dairymen better utilize their resources and reduce environmental impact from their operation.

In Henrico County, 71 homeowners were enrolled in the Virginia Cooperative Extension Lawn Knowers Water Quality Protection Program, which taught participants how to implement the best management practices for turf. Master gardener volunteers were trained to conduct site analyses and lawn evaluations, and enrolling participants received instruction in submitting soil samples for analysis. Extension staff combined the data from these two processes to prepare customized lime and fertilizer plans for each participant. Specially trained Master Gardener mentors then met with participants individually to discuss their plans and answer questions. Finally, a survey of participants was conducted several months later, after the lawn care season was complete. Participants reported significant increases in their adoption of recommended practices as a result of the program: 98% reported using square footage accurately to make management decisions; 95% reported fertilizing in the fall; 62% reported fertilizing three times in the fall, applying an average of 3.26 pounds of nitrogen total, well within program guidelines; 77% reported that they no longer remove clippings from the lawn; and 82% reported that they aerated the lawn.

Virginia Cooperative Extension obtained and examined 54 deep soil nitrate samples from Culpeper County cornfields, representing 1400 acres. Quick nitrate test results were available "same day" and determined that 72% of the acreage contained sufficient nitrogen to complete a successful crop. This information helped producers decide to avoid additional nitrogen that kept costs down and eliminated additional nitrogen going into the environment.

Pesticide Application

Adjuvants are now required in virtually all herbicides, either in the formulated product, as a tank-mix additive, or both. Optimizing their use in combination can improve herbicide efficacy, reduce the dosage required (therefore, environmental impact), and lower production costs. Research conducted by Virginia Tech scientists indicates that some proprietary herbicide formulations are already "optimized" for many common uses, in which case additional tank-mix adjuvants are an unnecessary extra expense.

Virginia requires that all persons applying pesticides on a for-hire basis obtain a pesticide license. Many lawn care and landscape professionals are not licensed. Virginia Cooperative Extension conducted a four-day educational seminar in northern Virginia to prepare unlicensed professionals to take the pesticide applicator's test. Surveys conducted at the end of the class revealed:--99% (53 of 54) participants who responded to the survey were applying pesticides even though they did not have a pesticide license.--87% (47 of 54) participants who responded to the survey report that they will adopt better pest management techniques such as integrated pest management (IPM) and choosing the least toxic alternatives.--100% (54 of 54) participants who responded stated that as a result of this course it would improve safety on the job.--80% (43 of 54) participants who responded feel that they would apply pesticides with the least impact on wildlife and the environment.

As a result of the "2001 Extension Pesticide Safety Educators Workshop", conducted by Virginia Tech Pesticide Programs in Blacksburg from Oct. 23-24, 2001, over 90 Extension agents learned new technology and information to better serve the citizens of the Commonwealth. The workshop involved 36 speakers and 16 field and classroom sessions. An on-line portion of the course was developed to support agents year around. This on-line "course" used the Blackboard Course Management program to manage on-line instruction and build a library of support media for agents, including over 70 PowerPoint presentations to teach clientele aspects of pesticide safety and technology.

As a result of offering pesticide safety education information to the public through the number of repeat visitors averaged 1,008/month in 2001-02.

A special effort was made by Virginia Cooperative Extension to assist the Amish community in Southside Virginia to make proper decisions pertaining to pesticide use and other agronomic decisions. Over 50 on-farm visits and consultations were made to Virginia Tech Pesticide Programs web site, 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 15,652 visits/month. These visits were calculated based on an average of 79,180 requests (hits)/month. Users downloaded an average of 28,873 pages/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. The the Amish community this past programming year. In addition, two meetings were held for this group which addressed specific issues pertaining to their type of agriculture. In one meeting, 11 Amish were re-certified for their pesticide permit and seven others were in

attendance to gain the production information that was made available. There are now 14 Amish producers that have successfully obtained their pesticide permit.

The VSU/ARS project “Removal of Pesticides From Plasticulture Runoff Using Vegetative Filter Strips” serves to determine the effectiveness of switchgrass and fall fescue filter strips in removing dissolved endosulfan and a copper-based fungicide from plasticulture runoff.

Vegetables grown using plasticulture is a large industry in the mid-atlantic and other regions of the U.S. This research provides quantitative data that will aid in the design of vegetative filter strips that can reduce insecticide and copper-based fungicide loads in plasticulture runoff.

Producers will have a choice to use either grass or in combination based on their effectiveness thus protecting water quality. One (1) research referred journal publications were generated in FY2002 from this project. Two (2) research presentations were made on research findings in FY2002 - one at VSU Annual Agriculture Field Day, and one at professional society meeting.

Soil Quality

Grain crop yields on low water-holding capacity soils are often unprofitable. Improved moisture and nutrient-use efficiencies are needed for profitability and environmental protection. Virginia Tech scientists are showing through soil quality measurements that increased organic matter accumulation is occurring in continuous no-till cropping systems, which will increase soil water-holding capacity and improve soil structure. These benefits will increase economic efficiency and soil resource sustainability.

Virginia Tech scientists discovered that despite the high concentrations of trace metals applied as a biosolid to a soil, no adverse effect on plant growth or excessive amounts of metal uptake were noted even 17 years after biosolid applications ceased if the soil was limed to the appropriate agronomic level. No apparent trace metal movement below the root zone could be detected either.

In cooperation with the Colonial Soil and Water District, Virginia Cooperative Extension in New Kent County conducted a two-day training on "Continuous No-Till Grain Production Systems" for over 150 local, state and federal agricultural agency employees. The objective was for the participants to increase their knowledge of, and have first hand experience with continuous no-till practices, then share with their producers the benefits of this conservation practice on soil and water quality while reducing nutrient and sediment runoff.

Approximately 900 producers and agricultural professionals throughout Virginia were given an overview of the potential for using poultry litter as a source of nutrients in forage and grain production systems by a Virginia Cooperative Extension Specialist. Approximately 225 wheat producers, agribusiness persons and agricultural professionals were made aware of the potential of using raw poultry litter, granulated poultry litter and pelletized poultry litter as a source of nutrients in small grain production systems.

Sustainable Agriculture

Over seventy percent of Craig County is forested and most landowners make little use of these forested areas. In Cooperation with the Craig County Rural Partnership, Total Action Against Poverty and Virginia Tech's Department of Wood Science and Forest Products a Wild Harvest Sector Program was designed to foster the sustainable propagation, harvesting, value-added processing, and marketing of forest grown medicinal plants and other non-timber forest products in this area. A demonstration plot of ginseng and goldenseal to be used as part future educational programs in Craig County was established by Virginia Cooperative Extension. In the spring of 2001, ten cooperator growers agreed to plant woods grown ginseng test plots. These plots will be evaluated in 5 to 7 years to determine the profitability of woods grown ginseng.

Private Landowners own more than three-fourths of the states forestland, yet few are aware of their options to help them maximize sustainability of their lands. Twenty-one participants from Loudoun County, representing 1656 acres, completed 12 hours of instruction through a Virginia Cooperative Extension program called "Woodland Options." As a result, 80% indicated they plan to use professional in the future and 100% identified a specific action that will help them meet their goals within a specific time frame.

Five-hundred students of diverse backgrounds in Arlington Public Schools learned of the connection between the food they eat and the plants that produce the food through Ready, Set, Grow. Developed and implemented by Virginia Cooperative Extension Master Gardener Volunteers, the lessons were presented in 24 classrooms from K-4 and featured pizza and the plants that are used to produce it. Teachers commented that it was an excellent end-of-year summary that reinforced earlier lessons. The most valuable lesson learned was learning the parts of the plant that we eat, and that we can eat what we grow.

Water Quality

Virginia Cooperative Extension faculty tested the willingness of dairy producers to reduce overfeeding of protein and phosphorus on 35 herds in Rockingham, Franklin, Augusta, Bedford, and Shenandoah Counties, and thus potential excretion of nitrogen and phosphorus into groundwater. Approximately 96 other dairy farmers became more aware of the problems related to such overfeeding and became more knowledgeable about the importance of feeding properly balanced rations through attendance at area dairy conferences.

Even under the best management conditions, livestock producers lose some of their animals each year. With increased concern about burial, groundwater quality, Transmissible Spongiform Encephalopathies (TSEs), and the decline in rendering services, composting of animal mortalities is being promoted and researched as an economically and environmentally sound manner of disposal. Virginia Cooperative Extension organized a Mortality Management workshop to provide livestock producers, especially sheep producers, fundamental information about composting specific species. Drs. Allen Harper and Mark Estienne of Virginia Tech and Dr. Lewis Carr of the University of Maryland were the resource speakers. Thirty-nine farmers from around the state attended the workshop. Since the workshop was held, Virginia

Cooperative Extension worked with 10 livestock producers to properly compost livestock such as turkeys, sheep, dairy and beef calves.

The Blackwater River in Franklin County, VA, was selected by the Virginia Department of Conservation and Recreation and the Virginia Department of Environmental Quality as a research and demonstration project to test new methodology for determining sources of fecal pollution in a large mixed-use watershed. The methods developed in the Environmental Microbiology lab at Virginia Tech (biochemical and genetic fingerprinting) proved to be effective tools to identify sources of fecal pollution. Over a 15 month study, samples from the Blackwater River were found to contain fecal bacteria from livestock, wildlife, and human sources in varying proportions. There was a seasonality effect, with fecal bacteria from human sources more abundant in the winter and fecal bacteria from livestock more abundant in the summer. With approximately even distribution among human, livestock, and wildlife sources, all three source categories will require attention to improve water quality in the Blackwater River watershed. Reductions of fecal bacteria in the water could be accomplished by developing and implementing best management practices (BMPs) to reduce fecal sources. State regulatory agencies will be working with county and local officials, citizen groups, and other interested parties over the coming year to develop BMP implementation strategies to reduce the pollution loading from human and agricultural sources. Reliable identification of fecal pollution sources will ensure that BMP efforts and costs are directed at the correct sources. After BMP implementation, source tracking also provides a tool that can be used to monitor the reductions and changes in the ratio of fecal bacteria from human, wildlife and livestock sources.

In a collaborative project between Loudoun County Soil and Water Conservation District and Loudoun County Virginia Cooperative Extension, \$119,658 of best management practices were installed under the 2002 Virginia Agricultural Best Management Practices Cost-Share Program, and \$34,757 of Conservation Reserve Enhancement Program practices were implemented. Thirty-one producers have installed a total of 11 livestock watering systems, 900 acres of winter cover crop, 26,750 feet of fence to limit livestock access to streams, and 2,775 feet of water pipeline to improve water quality.

With leadership from the Virginia Cooperative Extension Agent in Louisa County, civic and homeowner groups developed a water quality protection field day, "Land on the Lake Day", at the North Anna Nuclear Power Station. 5000 citizens received knowledge and skills in urban best management practices, including nutrient management, integrated pest management, water quality, and wildlife conservation.

Soluble reactive phosphorous (SRP) is considered a major contributor to surface water eutrophication. The VSU/ARS project "Chemical Fixation of Phosphorous in Manure Amended Agricultural Soils" attempts to identify characteristics of agricultural soils for their ability to retain phosphorous will help plan manure placement in environmentally sensitive agricultural soils in Virginia. Identifying these soil characteristics will allow for predicting the extent of phosphorous loss by erosion, leaching and overland flow ensuring farmers of the proper amounts of phosphorous to be placed thus protecting the environment and water quality. Preliminary results of this study indicated that application of lime and alum either together or in sequence could serve as an alternative management practice for retaining manure SRP in soils. One

referred journal publication was generated for submission from research findings of this project. Additionally, one presentation of research findings was given at VSU Annual Agriculture Field Day.

The VSU/ARS project “Development of Strategies to Use Farm Manures for Crop Production” addresses the heavy use of inorganic nitrogen fertilizers by Virginia farmers which also is harmful to the environment. In collaboration with USDA/NRCS and the Virginia Department of Conservation, this project study the use of alternative methods to reduce the application of inorganic fertilizers used for crop production. Litter produced by the large Virginia broiler industry is being combined with farm manures and organic materials. Experiments are being conducted to determine the suitability of organic additives, the most efficient composting methods, the economic feasibility of composting and practices that might enhance the quality of compost. Numerous educational fact sheets were generated and disseminated in FY2002.

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	50.39	0.2	0.0	1.0	0.1	0.0
2003	54.8	0.6	0.0	1.6	0.1	0.0
2004	54.8	0.6	0.0	1.6	0.1	0.0

Research SY's Only

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

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

Overview

During the reporting year, farm families, rural and suburban families, and families of urban populations benefited from Virginia Cooperative Extension's (VCE) efforts to enhance economic opportunities and the quality of life for these citizens of the Commonwealth of Virginia. 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.

Virginia Cooperative Extension's Agriculture and Natural Resources Agents (ANR) and Specialists conducted educational programs that helped sustain the profitability of agricultural and forestry production, while protecting and enhancing land and water resources. Programming efforts addressed a broad range of issues from traditional agricultural management and production in livestock and crops, to farm business management, soil and water conservation, land and water quality, the safe use of pesticides, forestry and wildlife, and commercial and consumer horticulture. A total of 183,015 extended learners were involved in this program area, and 12,663 volunteers who contributed 379,988 hours of volunteer time.

Virginia Cooperative Extension's Family and Consumer Sciences (FCS) programs, conducted by FCS Extension 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, 59,912 extended learners were involved and 7,248 volunteers assisted with FCS, contributing 99,535 hours of volunteer time.

In the reporting year, educational programs in these three areas reached nearly 601,330 participants through a variety of delivery modes including conferences, workshops, home-study courses, web-based and other distance-delivered programs, public fairs, home/family shows, and exhibitions. This represents a 13 percent decrease of participation over the previous year with 68 experienced agents retiring July 1, due to budget reductions. A total of \$14,513,273 external dollars were provided for the three program areas.

During the reporting year, Virginia 4-H programs reached 358,106 youth through schools and clubs. Of these, 181,070 were enrolled as 4-H members. Through a vast number of volunteers numbering 26,636, 4-H program efforts were supported and sustained. Volunteer commitment of these 4-H volunteers resulted in over 978,333 hours of volunteer time. Educational 4-H programs were delivered in context of 10 broad subject matter areas.

The Virginia 4-H mission, *“to develop youth and adults working with those youth to realize their full potential—becoming effective, contributing citizens through participation in research-based,*

informal, hands-on educational experiences,” was fulfilled during the reporting year by utilizing the knowledge of the land-grant universities and the Cooperative Extension System to provide opportunities for youth and adults:

- To increase their desire to learn and to understand;
- To learn and practice democratic leadership skills;
- To contribute as volunteers;
- To experience and appreciate cultural diversity;
- To develop partnerships with families and communities;
- To learn skills that will better their future and the future of others; and,
- To become caring, competent, capable, and responsible citizens.

Key Themes

Aging

To increase awareness and prevention of elder abuse, Extension worked in collaboration with four (4) other elder related agencies to implement area learning sessions in which 43 of the 45 (96%) professionals participating enhanced their knowledge in detecting and preventing abuse of elderly.

Thirty-six Amherst County Senior Citizens increased their knowledge of Identity Theft by 56% through their participation in VCE Programs. Those same participants indicated that they planned to make an average of five behavior changes to help protect themselves from being a victim of identity theft based on the information they learned in the programs.

To assist individuals and families with issues involving estate planning, a three-hour workshop was presented to 37 participants. 64% (24) indicated that they planned to prepare a list of non-titled property and designate how this property should be distributed.

Agricultural Financial Management

Extension specialists conducted three-grain marketing updates in the area during the first half of 2002. Fifty-two area producers attended one of those programs conducted by Dr. Dave Kenyon. Of those attending, 40 survey respondents stated that they would definitely (17) or probably (23) adjust something about their risk management strategy for their farming business.

Coordinated the collection of 34,000 lbs. of wool from 72 producers representing Virginia, West Virginia, Maryland, Pennsylvania, Delaware and the District of Columbia. This wool was marketed at a price 250% higher than in marketing year 2000, increasing producer gross income.

Seven farmers completed a year end financial check-up. As a result of these check-ups, 3 farmers eliminated enterprises that consistently lost money and wasted labor resources. One farm added a breeder/layer flock to diversify farm income. These seven farms had 4.7 million dollars of economic activity.

Through a renewable grant from USDA, Cooperative Extension at Virginia State University implemented the small farm technical assistance and outreach program, which started in 1993. Currently, the program serves approximately 800 farmers in 43 counties. As a result of improved record keeping and financial management, approximately 35% of the participants who are Farm Service Agency borrowers are now able to secure direct and guaranteed loans themselves directly from commercial lenders. Since farmers have learned to prepare loan applications accurately, more are having loans approved earlier and have received monies in time to purchase supplies for the planting season. As a result of technical assistance to farmers during past six years, more than 85 loan applications have been approved totaling over \$8.0 million. Records have been established for more than 70% of program participants. In a recent research to evaluate program impacts, it was determined that the program significantly increased net farm income (over \$12,000/year) for the average participant. It was further determined that the benefit increased with the intensity of participation in the program.

Virginia State University conducted risk management education to more than 300 farmers, farm family members and landowners. Workshops, individualized farm and home visits, demonstrations, field days and other methods were used to reach the target audience. As a result, many limited resource and hard-to-reach farmers, and land owners have initiated some form of risk management plan to mitigate against financial, production, marketing, human resource and/or/legal risks facing their operations.

Character/Ethics Education

During the reporting year, 87,147 youth were involved in 4-H educational programming dealing with CHARACTER COUNTS!, leadership projects, and other related subject matter programs. Serving as a national partner with the Josephson Institute in the development of statewide character educational programming, Virginia 4-H has partnered with schools, community leaders, local governments, civic groups, and private companies in the implementation of the Character Counts! framework. To date, 53 school systems, 1 alternative school, and 3 military bases have joined as partners with 4-H in this program. Additionally, a statewide CHARACTER COUNTS! Conference was conducted in Richmond with over 220 participants and Michael Josephson, founder of the Josephson Institute, as speaker. A total of 74 adult volunteers were involved in staff development programming with 4-H/CHARACTER COUNTS! during the year.

In response to local needs, Isle of Wight County 4-H partnered with Isle of Wight County Public Schools to introduce Character Counts in two elementary schools. As a result of participating in Character Counts, 57 teachers from two elementary schools report significant changes in student behavior. Teacher surveys indicate improved student behavior in the "Caring" pillar. Teachers observed improvements in students doing "kind acts for another" (3.33 to 3.7 on a scale of 1 to 5) and in students acting "sensitively to the feelings of others" (3.28 to 3.58).

During the reporting year, statewide surveys were returned from 55 schools in which we have 4-H working relationships in the 4-H/CHARACTER COUNTS! program. This represents 7,014 elementary school students. Of the 24 behavior indicators for the six pillars, statistically significant differences at the .05 level were found from pre to post measurement in all but the following indicators: cheating (trustworthiness), using threats, and judging others (respect).

However, differences in pre to post measurements for these indicators were in the appropriate direction. 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. Overall, this data indicates that the 4-H/CHARACTER COUNTS! program is making a significant impact in elementary schools in increasing behaviors that reflect positive character development.

Child Care/Dependent Care

In order to maintain licensing requirements, 110 child care providers participated in a regional workshop where 90% (99 out of 110) increased their knowledge and skills in healthy child environments, improving reading and music skills, and cultural arts to enhance child learning. All participants received 6 credit hours for licensing.

A total of 92 Central Virginia Child Care Providers in Amherst, Appomattox, Bedford, Campbell, Lynchburg and Nelson increased their knowledge and skills of providing quality child care by participating in Extension Child Care Provider Training Sessions. A total of 58 providers increased their knowledge about crisis planning for emergencies by 17%; 59 providers increased their knowledge about planning nutritious snacks by 35%; and 9 providers indicated that as a result of participating in an Extension training they are better prepared to help children cope positively with stress. 94%(15 of 16) of the child care providers who participated in The Ups and Downs of Outdoor Play training sessions reported learning new information that was relevant to them that they planned to use in their practice. Checking playground equipment prior to use was the practice most frequently cited as the practice they planned to implement.

Virginia State University facilitated seven satellite downlink programs of Better Kid Care related Hot Topics for Child Care Center Directors and family home and child care providers. Topics included, The Ups and Downs of Outdoor Play, Legal Issues, Toddlers: Terrible or Terrific, Secrets for Preventing Problem Behaviors, The Ups and Downs of Eating Times and Exciting Backyard Activities for Children. Participant evaluations were highly rated and a site coordinator's evaluation to Penn State was completed.

A Virginia State University specialist conducted a workshop on "Learning about Inclusion of Special Needs Children" to child care providers. All participants (100 Percent) who attended the workshop reported having a greater understanding of how disabilities affect development and greater sensitivity to include special needs children in child care settings.

Virginia State University continued a program to prepare parents to operate day care centers. Participants complete a 12-week training program presented in four (4) modules with content in Child Development, Creative Activities for Young Children, Positive Management of Young Children's Behavior and Health, Safety, and Nutrition. Fourteen participants completed the training during this reporting period. Pre and post-test-scores reveal that participants achieved 15 – 25 percent gain in knowledge of the topics covered. As a result of the training, 92% (13 out of 14) participants have secured employment in child care and other related industries.

Children, Youth, and Families at Risk

Approximately 65% of the youth participating in the Strong Families Competent Kids in school program stated that they were home alone after school for at least 1 hour, 80% of those youth stated that they learned several safety rules that they could use while home alone.

Sixty-five (65) at-risk fifth graders completed the Talking with T.J.-Conflict Resolution Series. During the series the students learned about trouble starters, trouble stoppers, and how to deal calmly and patiently with conflict. The teachers reported an improved effort in the students to think through their conflicts before acting.

Thirty-eight at-risk middle school students in Buckingham County (45% white, 55% black) participated in the Reaching Out for Teen Awareness Program, an interactive theater program addressing social issues these youth face on a daily basis. At the conclusion of the program, youth reported the following outcomes: acquiring life skills (85%), helping others (85%), thinking through all options before making a decision (85%), communicating effectively (81%), and gaining self-confidence (85%). Additionally, the administrative assistant in charge of discipline at the school noted that these youth had a better understanding of the consequences of their actions, and that they exhibited better decision-making skills in school.

Virginia State University developed vegetable gardens for inner city youth in Richmond, Virginia. Through collaboration with Virginia Department of Parks and Recreation, this after school program targeted youth-at-risk in low-income neighborhoods. The gardens were grown in vacant lots and on elementary school property. The children involved in the program ranged from seven to thirteen years of age. The kids learned how to plan for a vegetable garden, how to increase soil fertility through the use of lime, fertilizers and animal manures, how to plant seeds and transplants, how to control weeds through cultivation and the use of mulch and how to harvest vegetables and prepare them for direct marketing using a roadside stand. Participating youth gained experience production, business management and marketing of farm produce.

Communications Skills

275 4-H Club Officers received leadership training through 60 school clubs. These officers were taught the rules of Parliamentary Procedure and how to effectively conduct a 4-H club meeting. As a result approximately 95% of all meetings were conducted in a manner satisfactory toward getting a lot accomplished in the 45-minute time slot allotted for each meeting. Adult volunteers were also trained as classroom volunteer leaders.

4th graders 4-H members from 16 in-school clubs were given instructions on giving a speech. 95% (366) of these youth gave speeches, received recognition from 4-H, and were graded by their teachers as part of the SOL requirements.

4-H members developed communication skills, organizational and research skills, gained subject matter knowledge and skills, gained poise and confidence and learned creative expression through the public speaking, presentations and share-the-fun programs. Over 1000 youth participated in the three program areas. One hundred twenty-three (123) participated in public

speaking, two hundred eleven (211) in share-the-fun, and one thousand fifteen (1015) in presentations. Clubs held contest with blue ribbon winners in advancing to the county contest in public speaking and presentations. Blue ribbon winners in share-the-fun advanced to the county semi-finals with the top seventeen acts advancing to the county finals. Winners in the county competitions advanced to the Northwest District Contest. Thirty-eight members competed in the district competition with eleven winning. Eight senior members competed in the state contests with three winning, two placing second and one third. Six members participated in the Share-the-Fun state show. The agent was the Coordinator of the State Share-the-Fun Show.

Community Development

United States Department of Labor, United States Department of Agriculture grant submitted with, and co-authored by, Brian Calhoun, Gary Larrowe and Dr. David Lamie entitled "Building Community Workforce Assets," with special focus on training Southwest Virginia residents for projected information technology related jobs was successfully funded in the amount of \$5,000. This grant allowed Information Technology Conferences to be offered in July for the Southwest District and January for Grayson County. Further, this grant served as the basis for Virginia Cooperative Extension's successfully funded \$749,000 technology opportunities program proposal entitled "Getting Rural Virginia Connected: A Vision for the Future."

Development and implementation of the first district-wide planning academy, "The Changing Face of Southwest Virginia...Planning Tomorrow, Today." This seminar was offered in February to a capacity audience of 107. Attendance included elected and appointed officials, planning commission membership, Extension Leadership Council membership, Extension staff and faculty, Industrial Development Authority representation, etc. The average session ranking by participants was 4.0 on a scale of one to five, five being the highest possible.

Fifty-two (52) youth participated in the 'Real World', a six-week lifeskills program, and 42 youth (81%) graduated. Youth reported knowledge gained in money management, time management, simple home repairs, apartment or house selection, planned parenthood, healthy eating and career choices; twelve (12) counselors volunteered over 644 hours to the City of Richmond camping program.

Consumer Management

One hundred sixty six (166) food service managers and /or workers completed (6 courses) the managers applied Foodservice Sanitation Certification Course (16-hour training). One hundred thirteen (113) foodservice professionals (96%) obtained national certification by passing a National Restaurant Association examination.

One hundred eight (108) Foodservice workers successfully completed the 16-hour SERVSAFE Certification Program. 95% of the participants passed national certification requirements with an average score of 87% out of a possible score of 100.

Safe food handling and preparation was demonstrated to 28 low income, mentally challenged minorities and their 5 counselors. The participants completed a survey about their food handling

knowledge behavior. Nineteen (61%) now understand that bacteria is the main cause of food borne illness. A follow up survey indicated that all participants wash their hands correctly 75% of the time.

Estate Planning

To assist individuals and families with issues involving estate planning, workshops were presented to 37 participants. 64% (24) indicated that they planned to prepare a list of non-titled property and designate how this property should be distributed.

More than 300 people were educated through in-depth personal finance workshops. Of the 54 participants in budgeting/credit/saving workshops, 92% pledged to save specific amounts of money each month.

Six hundred and fifty-seven (657) individuals participated in the "Financial Planning and Investing for Retirement" presented in ten separate classes to state employees in the Virginia Retirement System and military personnel at Fort Lee. Of these, 81% (532) indicated that, as a result of the program, they would increase their personal savings and investments, as well as decrease their consumer debt, thus improving their financial situation. One participant in a VRS class said that he had "never before been so powerfully motivated to get out of debt and save more money . . . I wish I had been able to take this class long ago."

Family Resource Management

A variety of financial management programs were offered assisting families and individuals to increase their financial literacy and improve their financial skills. Nineteen (19) volunteers completed 21 hours of the Family Self-Sufficiency Financial Mentor Education training. Mentors were assigned to 24 TANF clients and 11 residents for one-on-one financial counseling. 54% of the participants receiving financial counseling attended 2-4 sessions and completed at least one financial goal. Mentors contributed 704 hours to conduct training and one-on-one financial counseling valued at \$13,326.72.

Over 20 hours of Volunteer Financial Management training were provided to 18 adults who have taught 18 classes in Powhatan and Goochland counties reaching over 142 people. All 142 participants reported that their money management skills have improved.

Fourteen participants enrolled in the Chesterfield County Money 20/20 Program and completed the debt analysis process, which entitled them to receive a 'Zilch' debt reduction plan to accelerate debt payoff. Their average payoff time was 3.30 years for a monetary saving of \$244,021. Collectively, their accelerated payoff plans will be used to payoff \$637,557 worth of consumer debt. 13 of the 14 participants will be debt free within the next five years.

Over 2,500 students participated in programs ranging from tours of the University's aquaculture facility to the establishment of fish production systems in public schools. A School Aquaculture Competition Award is given at the Virginia State Fair each year. A summer program for teachers to incorporate aquaculture into Standards of Learning in Virginia's Secondary Schools was

provided. To increase their incomes and exert greater control over their lives, more people are starting home-based and micro businesses (HBMB). They include youth entrepreneurs, persons with limited resources, farmers and current and potential business owners. An Extension Specialist from Virginia State University conducted conferences, workshops and related educational programming focused on food processing and agri-tourism. Publications and training videos on starting a food processing business were produced and distributed. An agri-tourism curriculum has been developed and in-service training provided for Extension agents. As a result of the food processing business training held in Southwest Virginia, four individuals are forming businesses and a food product line. With the rapid growth of agri-tourism in Virginia, more families are planning vacations on farms in rural areas where they engage in fee-fishing, hay rides, tours, horseback riding, corn mazes and festivals. One Wythe County farmer, who designed and constructed a corn maze on his dairy farm, said this agri-tourism enterprise became the most profitable part of his farming operation. It is anticipated that agri-tourism will help revitalize Virginia's rural economy and strengthen agri-business by bolstering farm incomes and creating a multiplier effect of tourism dollars in rural communities.

Home-based Business Education

279 participants enrolled in Micro and Home-Based Conferences offered in Chesterfield County. 95% (264) met the requirements to receive either professional development or accreditation units for their occupation. At one conference, 90% (103 out of 114) of the participants learned a technical skill for the business of childcare. They became more aware of how to look for causes or reasons for a child's behavior, especially disruptive behavior. 58% (66 of 114) of participants learned to plan structured activities and avoid down time in a child care setting.

During FY 2002 approximately 42 Newport News family child care providers (mostly middle to low-income) participated in six (6) continuing education workshops to improve their business skills, and increase their knowledge of sound child care practices. Thirty-five new providers were recruited and taken through the Department of Social Services certification process. Two hundred-twenty new contacts were made to recruit providers. Grant-funded program totaled \$36,000.

Fourteen (14) beginning entrepreneurs who completed the program, "How to Start and Run a Home-Based or Micro Business." Of these, 86% (13) created or continued to operate their own micro business. Of these businesses, 5 were personal services, 4 were retail, 2 were equine related, 1 was consulting, and 1 was transportation. The participants learned about the skills required to be a successful entrepreneur, marketing a business, managing cash, and taxation. One participant stated that the series of 5 classes "gave me a little more courage to take the plunge and go ahead and start my business . . . thank you for showing me how I can be more independent."

Leadership Training and Development

90% of summer day camp participants reported that they gained leadership and life skills through 4-H camping experiences. Leadership and life skills were gained by 90% of special interest club members (143 of 159), an increase of 53%.

Over 315 youth and 51 volunteer counselors conducted the Halifax Junior 4-H Camp in late July, 2001. Of these youth, over 51% were returning in Late July, 2001. Of these youth, over 51% were returning campers from the previous year with 23 of 31 (75%) returning as qualified teen counselors. Experienced teen counselors and adult leaders teach counselor-in-training classes. This is an impact that demonstrates leadership development as a life skill.

Forty-five Rotary Club volunteers were recruited from four clubs to help work with 4-H members in the Character Counts program. The twelve member 4-H Administrative Board, other 4-H leaders, and about 25 agency directors provided leadership to get input in youth program needs in the county. Four hundred twenty-five volunteers learned how to plan and conduct 4-H programs of quality for 4,938 county youth. Youth in turn gained knowledge and skills in leadership.

Parenting

In response to parent needs assessment administered through the Alleghany School System, Extension collaborated with two local child related agencies to implement a series of 12 programs (3 community workshops with 4 topics each). 88% of the parent participants (86 of 98) indicated increased knowledge and skills in child development, discipline, communication, health, safety, and school success.

As a result of a mandate from the General Assembly for parents involved in custody disputes to receive parenting education the following resulted: Of 129 parents participating in the "Living Apart Parenting Together" classes, 96% indicated the classes assisted them in how to reduce parental conflict, 95% indicated the classes provided them with ways to further their child's adjustment to the separation, 97% said it increased their understanding of why children need and want a healthy and meaningful relationship with both parents and offered ideas on how to successfully share in the parenting of their children, and 96% stated the course taught them skills to keep children out of the middle of parental conflict.

Eight (8) parents of juveniles in Powhatan County's First Time Offender or Diversion Program completed a 4-session parenting class. 77% reported a better understanding of appropriate parenting skills as a result of participating in the sessions.

Twenty-seven (27) parents of First Offenders participated in Parenting Education classes as court ordered. Twenty-five parents reported that before the end of the classes they had been successful in improving communications with teenagers.

Promoting Business Programs

A Food Cooperative developed by Madison County Master Gardeners provides fresh, organic produce for approximately 40 members, and generates about \$8,000 of income for small, local producers seeking markets for their crops.

As a result of a \$50,000 grant from the APPALACHIAN REGIONAL COMMISSION with \$15,000 match from WORKING PARTNERS FOR SUCCESS, paired with off-time use of the

Food Service Class Room at Dickenson County Career Center, VCE was able to launch the "How to Start a Food Processing Business" training. Two 40-hour sessions was held with 11 participants, 6 of whom are processing with business development, learned what it takes to start their own business. The training included business development, product development and certification, marketing, financing, and hands-on product development.

Multi-cropping plasticulture demonstrated returns of up to \$27,000 per acre for small acreage growers. This offsets the cost of establishing the system.

Promoting Housing Programs

A major initiative was launched to help ex-offenders and welfare women locate safe and secure housing and maintain rent payments. Although previously not permitted, our Housing Authority decided to allow women with criminal records who participated in Extension's financial mentoring program to access Section Eight housing vouchers. One young woman/mentee transitioning from prison was even hired as the receptionist for the Housing office.

Sixty-three (63) people were involved in the 2002 Housing Conference, sponsored and conducted by Cooperative Extension. 92% were new clientele to Extension, and twelve (12) volunteers utilized and \$1,100 donated. 90% rated the training provided through the conference either excellent or good.

Thirty-one Newport News Companion Providers (caring mostly for elderly people) learned new housekeeping skills and improved existing skills to enable them to better care for their clients. As a result of participation in workshops thirty-one (31) companion providers are caring for their clients in a safer and healthier manner. Twenty-four (24) said they would change their cleaning habits and be more cautious of cleaners they use in the home. Thirty-one (31) said they would do a chemical check and properly dispose of hazardous chemicals not being used.

Nine hundred twenty one (921) individuals who participated in Home and Housing Education Programs increased their knowledge and developed new skills in home repair (plumbing & electrical) with an approximate net savings of sixty dollars (\$60.00) per month in repair cost.

More than 100 persons attended Virginia State University's Southside Virginia Housing Conference in 2002. Of these, over ninety five percent said the conference influenced them to begin home improvement projects and at least one person purchased a home. Twenty Home Maintenance and Repair Workshops were conducted this program year for 400 home owners and renters. Thirty eight percent (38) indicated that they did minor repairs on their plumbing, electrical and heating systems, thus saving them thousands of dollars in home maintenance costs. Educational teaching props were design and developed for classroom use in the areas of electrical, energy conservation, window and screen door repair, drywall repair, and replacing broken glass in a window.

Supplemental Income Strategies

As a direct result of 19 risk management meeting presentations made across the SE Virginia district in cooperation with ANR agents to 758 producers, 2002 crop year planted peanut acres decreased by 30% in southeast Virginia. As a result, peanut farmers saved approximately \$3,240,000 in peanut quota rental.

A live crab shedding system for the production of soft-shell crabs was designed for the production of soft-shell crabs. These crabs are a high valued product, and provide the processor with a second product line. The seafood processor was able to generate an additional \$100,000 dollars worth of soft-shell crabs in addition to his regular crab meat products. The processor is expanding efforts in this area due to its demonstrated profit potential.

Extension provided the technical expertise for and coordination of cooperative cattle marketing project in Bedford County. Producers worked together to wean, feed, vaccinate and market a total of 203 steers in three separate sales. These cattle sold for \$2.87/cwt. more than similar cattle sold on the same day, resulting in an additional \$4042.00 in income for these producers.

Through educational programs conducted by Virginia Cooperative Extension, a number of the farmers have adopted cut flower enterprise as a source of supplemental income. Many of these have been tobacco farmers, cash grain farmers and livestock farmers. These beginning cut flower growers sell an average of \$5,000 of cut flowers each year. Over 120 persons participated in a Cut Flower Growers Conference held at Virginia State University in March 2002.

Workforce Preparation – Youth and Adult

Through the Mini-Society, entrepreneurial program, 47 youth between the grades of 3-7 in Surry County studied economics, government and business practices. Through this eleven-week session, youth and leader volunteers created their own society creating a flag, currency and governing rules. Youth created their own businesses and sold items to make a profit. Through the pre/post testing method, the youth improved in their knowledge of economics by 19%.

4-H members in the fifth grade at Southwestern Elementary School had the opportunity to participate in hands-on activities involving owning their own business and Mini-Society. These students had to make decisions on the types of products or goods that would be sold, what resources would be needed, where to set up business and who they would partner with. Students accepted roles necessary for maintaining a business and felt good about their accomplishments. Ninety-one out of 107 maintained their business until the end. Two companies failed because of lack of resources and weather (ice cream company) The most successful company was a group of 6 boys who decided to build bird houses as their products. Each person was given a specific assignment and when they failed to produce, their classmates questioned them. They truly learned the value of teamwork and supply and demand. Birdhouses were decorated and sold for 10.00.

Youth Development/4-H

To assist at-risk vocational students (Teen Outreach Program - TOP) with job skills for working in nursing homes and day care centers, Extension provided elder and child development and sensitivity training in which 28 of the 34 (85%) of the participants improved their knowledge of caring for the elderly and children.

1,300 youth were reached in the "Power Up" program. Parents continue to appreciate the safe environment for their youth after-school. As a result of the program, 30% of the participants have improved their reading and study skills through the homework help center. 100% have reported passing to the next grade level. Through cooperative activities, the program staff reported that 20% of the youth participants have changed behavior and has been evident in the classroom.

4-H initiated Barrios Unidos/United Neighborhoods, Inc. continue to reach youth at risk of or involved in gang or violent behavior. 150 youth participate in after-school and self discipline classes offered by the group. School counselors and Hispanic parent liaison report that this experience has been very helpful in helping youth to control emotions and anger. Former Barrios Unidos youth member was recently recognized with one of eight Best of Reston Awards for his community service and leadership efforts. Member has contributed over 1000 hours mentoring other youth and involving them in positive anti violent activities. Member was also the keynote speaker at the 2002 CYFAR Conference in New Orleans, LA. His 60-minute speech shared personal story and how he had been able to overcome those struggles by being involved in programs like Barrios Unidos and 4-H.

During the reporting year, Virginia 4-H programs reached 358,106 youth through schools and clubs. Of these, 181,070 were enrolled as 4-H members. Through a vast number of volunteers numbering 26,636, 4-H program efforts were supported and sustained. Volunteer commitment of these 4-H volunteers resulted in over 978,333 hours of volunteer time, contributing \$19,341,643. Educational 4-H programs were delivered in context of 10 broad subject matter areas.

Cooperative Extension at Virginia State University collaborated with District 19 Prevention Service, to conduct the first annual Youth Development Seminar at the University. The purposes of the seminar were to encourage youth to pursue positive personal development through professional training and exposure to youth role models; to provide a mechanism that opened the doors for future personal development training and career development; and to highlight the field of entrepreneurship. Thirty-eight youth, ages 13 – 17, from the city of Petersburg and surrounding counties participated. As a result of the seminar and other follow-up programs, three girls have completed child-care certification and two at-risk teenage female students stayed in school during the fall 2002 semester, as opposed to being expelled from the local system.

During the 2002 4-H Congress at Virginia Tech, a specialist from Virginia State coordinated 24 community service projects that involved 425 youth from throughout the state of Virginia. Youth to participate in a variety of pre-arranged community service learning activities over the course of two days. Projects were categorized under these 4 broad topics: 1) Historical park

maintenance and beautification projects, 2) Fire and rescue experience projects, 3) Volunteer clothing shop assistance projects, and 4) Service Learning Simulations. Activities performed included planting seedlings and shrubs, developing plant scale maps, tree trekking, studying electrical safety and conducting safety audits, wardrobe planning, resource and money management, and youth and adult partnering. Data from the reflection process were analyzed to determine what 4-H'ers gained from their involvement in the project and to determine if the project influenced delegates to conduct community service learning projects in their home communities. Results indicated that the projects evoked a strong sense of altruism, taught new skills or information about a topic to which there was little prior knowledge or exposure, taught the importance of teamwork, and assisted in generating ideas and resources for future projects. Overwhelmingly, delegates cited the projects as being valuable and beneficial to their development in 4-H.

Virginia State University conducted Youth Aquaculture Program with more than 30 schools

Animal Sciences. The number of youth participating in various 4-H educational programs related to animal sciences totaled over 27,000 for the reporting period. These youth focused were involved in various 4-H educational programs related to the animal sciences with programs focused on the care, management, fiscal responsibility, and evaluation of livestock, horses, and companion animals. Livestock shows, judging teams events, and learning sessions continued to provide important learning experiences in this area. The 4-H Virtual Farm continues to be a success with its focus on animal sciences dealing with beef, dairy, poultry, and aquaculture. A new component to 4-H Virtual Farm was added this year—4-H Horse. Over 55,000 youth were involved in hands-on learning stations dealing with these subject matter areas, and numerous adults were also attracted to this. Among all animal science projects, the 4-H Embryology project, designed to support classroom learning around the Virginia Standards of Learning (SOL's), was the most popular with 18,539 involved. External dollars contributed to the animal sciences totaled \$1,527,907 during the reporting period (4-H and FFA Livestock Shows).

Careers and Economic Education. Over 11,500 youth were involved in career exploration, entrepreneurs, and high school financial planning educational programs throughout the state. As an example of this, approximately 78% of the 8th grade students participating in the career and goal setting 4-H program in Petersburg, said that they were interested in obtaining some type of employment this summer or when they turn sixteen, 98% of those students stated that they learned new skills for interviewing for a job.

Citizenship. Some 181,000 youth benefited from citizenship programming activities, knowledge, and events this year. During the 2002 State 4-H Congress, over 850 youth participated in community service learning projects, resulting in an increased knowledge and appreciation of giving back to the community.

Communications and Expressive Arts. Working closely with adult assistance, 19,790 youth were actively involved in communication skills development and expressive arts through projects and events related to public speaking and presentations. The Virginia 4-H program continues to place high priority in preparing youth in the development of their communication skills.

Environmental Education and Natural Resources. Over 57,000 youth were involved in environmental education and natural resources related projects and programs which contributed to their learning and skills. The utilization of the 4-H Water Wizard Van throughout the state provided additional hands-on learning opportunities for youth in the local unit, as well as during summer 4-H camping programs. Outdoor and environmental education programs involved thousands of school-aged youth in hands-on, experiential education opportunities related to the Virginia Standards of Learning. Forestry 4-H programs were conducted at five of the six 4-H educational center's summer camping programs, after a successful piloting of this program the previous summer. This resulted in increased youth awareness and understanding of forestry issues throughout the Commonwealth. Also, water quality programming was emphasized with over 13,000 youth participating in water resource related programs which contributed to their knowledge, understanding, and appreciation of water resource issues in Virginia.

Family and Consumer Sciences. Nearly 17,000 youth were involved in family and consumer sciences projects and programs. The 4-H Strong Families, Competent Kids program, focusing on latchkey youth, continue to involve additional youth in learning survival skills. Participants continue to report increase in knowledge and skills gained through the program.

Food, Nutrition, and Health. Over 16,000 youth participated in food, nutrition, and health related projects and programming opportunities during the reporting period which resulted in increased awareness and understanding of food safety and nutrition.

Leadership and Personal Development. During the reporting year, over 99,000 youth were enrolled in the Virginia 4-H/CHARACTER COUNTS!, with over 87,000 involved in educational programming dealing with CHARACTER COUNTS!, leadership projects, and other related subject matter programs. Serving as a national partner with the Josephson Institute in the development of statewide character educational programming, Virginia 4-H has partnered with schools, community leaders, local governments, civic groups, and private companies in the implementation of the Character Counts! framework. To date, over 50 school systems, 1 alternative school, and 3 military bases have joined as partners with 4-H in this program. During the year, the 4th annual statewide 4-H/CHARACTER COUNTS! Train-the-Trainer event was conducted in Richmond for some 70 volunteers and Extension agents, with a pre-CHARACTER COUNTS! Conference for over 220 individuals. Michael Josephson, founder of the CHARACTER COUNTS! Coalition, was guest presenter. Additionally, over 230 adult volunteers were involved in staff development programming this year resulting in numerous presentations on this framework.

Plant and Soil Sciences. Approximately 22,500 youth engaged in plant and soil sciences programs and projects. The 4-H Junior Master Gardener program was implemented to involve youth and Master Gardeners in increased knowledge and use of plant and soil sciences.

Science and Technology. 63,927 youth were involved in science and technology project and programs during the reporting period. Technology programs such as the 4-H Virtual Farm, Clean Water for the Frog, Virginia First Lego League, and other creative approaches to utilizing technology provided new learning opportunities for youth.

Virginia 4-H has retained its national recognition as being a leader in the delivery of camping-based educational programs in the past few years. During the reporting period, the six 4-H educational centers and individual units involved 30,175 youth in 417 camping sessions with 4,500 volunteer leaders assisting. Continuing to rank second largest in the nation in terms of number of participants, Virginia's 4-H camping program is fully American Camping Association Accredited, a feat which the first largest camping program has not attained. This is the highest recognized camping accreditation available in the nation in terms of safety and program quality. Program impacts included:

- A total of 30,175 participants were involved in 417 camping programs through 4-H.
- A total of 7,359 participants were involved in 119 outdoor and environmental education programs at Virginia's six 4-H educational centers.
- Each participant in the 4-H camping program received a minimum of six hours of educational programming through 4-H; most exceeded this number of hours.
- 6,260 adult and teen volunteers were involved in staff development opportunities in camp counseling and assisted with the 4-H camping and special interest programs.
- These volunteers contributed a total of 726,320 hours to the 4-H program.
- 91% of 4-H campers reported that they gained leadership skills

4-H camping experiences at the six 4-H educational centers. Virginia 4-H focused on working with under-served populations and reaching at risk youth. This included designing a collaborative approach in its Children, Youth, and Families (CYFAR) initiative, involving communities in Brunswick, Fairfax, Arlington, and Alexandria units. The following data on 4-H reflects the work for the year:

Title of Program	Volunteers	Volunteer Hours	Extended Learners	Resources: Publications	Resources: Apps.	External Dollars	Meetings Conducted
4-H At-Risk Youth Program	1,729	23,096	38,235	20	9	\$1,145,276	1,815
4-H Camping	46,260	726,320	36,492	142	36	\$574,123	1,492
4-H EFNEP/ SCNEP	659	5,480	11,687	28	7	\$32,249	1,566
4-H Program Delivery	16,033	531,257	238,255	3,439	156	\$879,386	22,966
4-H Volunteer Development and Management	4,024	213,935	33,437	194	45	\$48,511	974

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	128.36	4.7	0.0	31.0	12.0	0.0
2003	141.5	7.0	0.0	8.9	12.0	0.0
2004	141.5	7.0	0.0	8.9	12.0	0.0

Research SY's Only

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

C. Stakeholder Input Process

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

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

Extension Leadership Councils

The formalized means through which Virginia Cooperative Extension (VCE) establishes connectivity with the grassroots of the state is through partnerships known as Extension Leadership Councils (ELCs). At the local level, this partnership represents the diversity of each county and city in which VCE exists as a resource. Representation includes VCE programming areas (4-H/Youth Development, Family and Consumer Sciences, and Agriculture and Nature Resources), community leaders, and other organized community entities, which are natural partners for VCE. Extension staff and Leadership Council members work as equal partners to determine needs, establish program priorities, plan and implement solutions, identify and secure resources, market VCE and its programs, evaluate, and report program results/impacts to program stakeholders.

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

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

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

The VCELC met 4 times during this reporting period, with average attendance of members at approximately 35 members per meeting. The meetings provided a significant opportunity for volunteer members to communicate with VCE leadership concerning the issues/concerns and activities of the local ELCs, which they represent. In addition, planning district representatives provided communication to local ELCs concerning the work of the VCELC. The meetings also served as a significant forum for VCE's administrative and programming leadership to collect grassroots' input in the programming and administrative function of the organization. The VCE director and administrator met 4 times during this reporting period with the lay officers of the VCELC to ensure that meeting agendas reflected the collective view of the membership and to determine actions and decisions to be brought before the entire council.

Virginia State University Leadership Council

Virginia State University has developed its Agricultural Research, Extension, and Teaching Leadership Council. This Council provides advisory and stakeholder input for the total land-grant program, including research, extension, and teaching. The Council meets two times a year face to face. The Council met during the spring and fall of 2002. The committee elected a chair, vice chair and secretary. The next scheduled meeting is Spring 2003.

College of Agriculture and Life Sciences Leadership Council

The college council membership is composed of 80 individuals in 2002, external to the University, invited by the Dean. The purpose of the council is to establish open and regular communications between the college and the council and mutually understand the programs and activities of the college and the needs and aspirations of the professions and citizens it serves. The Council meets twice in 2002 (January and September).

Agriculture and Natural Resources Leadership Council

The Virginia Tech College of Agriculture and Life Sciences Leadership Council formed an ANR Council in July 1999. The ANR council functions as a sub-group of the College of Agriculture and Life Sciences Leadership Council. The Council assisted in the identification and description of critical short-term, intermediate, and long-term agricultural issues facing Virginians. The Council considered current and planned ANR extension and research programs, funding, and structures and made recommendations on the needs of industry, producer and consumer clientele.

Family and Consumer Sciences & Community Initiatives Extension Leadership Council

The Family and Consumer Sciences & Community Initiatives Extension Leadership Council provides vision for the Virginia Cooperative Extension Family and Consumer Sciences & Community Initiatives (FCS & CI) program and develops strategies which lead to the fulfillment

of that vision. The FCS & CI Extension Leadership Council identifies statewide problems, issues, and concerns; assesses current programs and decides on the prioritization of program resources including funding; creates and monitors a strategic plan; explores opportunities for cooperation and collaboration; and monitors and reports program outcomes to appropriate public and private partners.

The Family and Consumer Sciences & Community Initiatives (FCS & CI) Extension Leadership Council met three times in the past year at different locations across Virginia. A major accomplishment was the development and implementation of a Marketing Plan in cooperation with Agricultural and Extension Communications. This effort included the preparation of an informational booklet entitled Family and Consumer Sciences & Community Initiatives: Empowering People with Knowledge to inform stakeholders of FCS & CI impacts at the local level, and a presentation to University administrators. The Governor's Conference on Aging: Touching Lives with Creative Solutions, co-sponsored by the FCS & CI Extension Leadership Council and the Virginia Department for the Aging, provided workshop tracks on rethinking work and retirement, long term care, intergenerational programs, and approaches to holistic health for more than 500 Extension professionals, community service providers, and older individuals. Other Council activities for the year included a revision of the by-laws to facilitate operations and a review of membership categories in an effort to increase representation of community partners. The Council continues to monitor the implementation of the three- year strategic plan of the state Family and Consumer Sciences & Community Initiatives program.

4-H Leadership Council

The Virginia 4-H Leadership Council, consisting of 32 members, was created in 1994. It represents the diversity of the state's 4-H program and includes all major 4-H stakeholders. The members are recruited and selected to represent the six Extension Districts in the state, and each major group of stakeholders, including District Directors, Extension agents, and volunteers. At-large members are also on the Council. At the November 2001 meeting, Council members were given an updated map that showed the location and ethnic diversity of the council body.

During the reporting period, the Council met four different times, including one time by Symposium Conference Calling, due to budget reductions by the state. The Council is divided into three active working groups: Policy, Emerging Issues, and Marketing. The Policy Committee reviewed three (3) 4-H Policies and established recommendations for changes, and gave approval for web-based 4-H curriculum. The Emerging Issues Committee addresses many issues identified by the Council; such as the loss of so many 4-H agents due to early retirement, the budget cuts imposed by the state, and working with restricted 4-H agents with no staff development funds available. It also provided feedback on the Leadership Institute for 4-H teens at State 4-H Congress, 2002. The Marketing and Public Relations Committee developed a plan to promote 4-H at the State Fair, 2002; publicity on both campus of Virginia Tech and Virginia State, National 4-H Week Events, the Centennial Celebration of 4-H, the 4-H Alumni Search, and promotion of 4-H with 30-second PSA's. Some 3500 4-H pins were mailed to 4-H alumni. The committee further reviewed and recommended modifications to the "4-H For Life" magazine, and several promotional stories and pieces were developed and published during this

centennial year. The Council's activities continue to help shape educational programs that meet the needs of the youth of Virginia.

Local Government Reports

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

College of Human Sciences and Education

Stakeholder input through advisory boards continues to be a major emphasis of the College of Human Sciences and Education. In the past year, one additional advisory group has been added, bringing the total to 16. 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 more often.

College of Natural Resources Advisory Council

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

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

Agriculture Industry Boards

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

Research projects funded by the Virginia commodity boards are as follows:

<i>Virginia Commodity Boards</i>	No. of Projects	Funds Awarded in 2002
Corn	8	\$ 65,534
Horse	4	\$ 18,000
Peanut	8	\$ 216,369
Small Grains	10	\$ 69,500
Soybean	6	\$ 45,000
Cotton	12	\$ 53,593
Apple	3	\$ 13,346
Beef	1	\$ 13,500
Bright Flue-Cured Tobacco	7	\$ 35,500
Dark-Fired Tobacco	3	\$ 5,000
Pork	3	\$ 7,300
Winegrowers Advisory	4	\$ 48,283
Egg Commission	1	\$ 19,272
Sweet Potato	2	\$ 4,828
Irish Potato	3	\$ 10,992
Cattle Industry Board	1	\$ 3,000
Virginia Agricultural Council	26	\$ 391,755

The Sheep Industry Board and the Small Grains Association did not fund research projects in 2002.

Additionally, the Virginia Agricultural Council was established by the General Assembly to provide a mechanism for financing agricultural research, education and services. Funding comes from assessment levied on certain agricultural supplies used by farmers. The Governor appoints 18 members of the Council who represent a wide range of farm commodities. Research and extension personnel applying for these funds, likewise, are provided valuable stakeholder input during the competitive awards process. The Virginia Agricultural Council funded 26 projects at Virginia Tech in 2002 totaling \$391,755.

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 2002, input was gathered from multistate Extension and integrated activities project leaders through a questionnaire they completed on the success of their projects and programs.

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. Project leaders stated that this input is very important in identifying high priority issues and in shaping research and educational responses.

Project leaders 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. In most cases, project leaders 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 project leaders 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.

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

Institution Virginia Polytechnic Institute and State University
State Virginia

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

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

Steven H. Umberger
 Director

2/17/03
 Date

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

Brief Summaries of Multistate Extension Activities

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

Pasture based Beef Systems for Appalachia

Other states involved: WV, USDA ARS

This is a long-term project involving developing pasture-based beef production systems from calving through finishing and, ultimately, retail. Production systems investigated include heifer development, cow-calf grazing, stocker-backgrounder and finishing systems. Development, feasibility and marketing of a regional pasture-finished beef product is also being investigated. Transfer of the technology developed by this project is also a project goal.

Herbicide Recommendations for Agronomic Crops

Other states involved: MD, DE, NJ, WV, PA

Specialists from each state listed above perform applied research on weed control in agronomic crops and evaluate new herbicides or other weed management techniques. The results of this research form the basis of the multi-state weed control guide for agronomic crops published by VT and U of Maryland under joint authorship. One major annual meeting of the specialists is conducted to synthesize and modify the recommendations. Impacts are specifically the formulation and publication of the recommendations annually. The hard copy and web-based versions of the PMG series and the Maryland weed control guide are the documented outcome.

Re-Evaluation and Refinement of an Index for Identifying Peanut Fields at Risk to Pod Damage and Losses to Southern Corn Rootworm

Other states involved: NC

Southern corn rootworm (SCR) is an annual soil pest of peanut in VA and NC, and an occasional pest in SC, GA, OK and TX. Larvae feed in the soil on developing pods which reduces yield, and allows entry of secondary pod diseases that affect nut quality. Because it is a soil pest, detection is difficult and many producers make preventive soil insecticide treatments with no knowledge of actual pest abundance. Our research showed that much of the peanut acreage is never actually infested by rootworm, and infestation level is influenced by several factors such as soil type, pest history, and cropping practices. We integrated these factors into a risk index that identifies fields at risk for rootworm damage to peanut pods so only those fields are treated. This program addresses an insect pest issue that impacts VA and NC peanut growers. Any pesticide use is of special concern to peanut growers both for economic and food safety reasons. This program impacts many peanut growers, across all audiences. All peanut growers and Ag-related support industry personnel have equal opportunity to participate in information exchange with the project leader, and opportunity to attend information updates. Meetings are designed to coincide with when growers can attend without interfering with major farming activity periods. Project results are summarized in a variety of media to accommodate both computer and non-computer based clientele. Documentation of program outcomes and impacts is not a well-defined process, nor does the project leader have ample time, resources or expertise to participate in the data-gathering process necessary to accurately measure adoption or impact. However, in 2002, results of 392 field studies on commercial peanut fields in VA and NC that had been

conducted from 1997-2001 were used to re-evaluate the index. Use of the index resulted in actions that protected fields from economic loss to SCR 98.5% of the time.

Integrated Pest Management for Field Crops (Alfalfa, Corn, Soybeans, and Small Grains)

Other states involved: MD, DE

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

Pasture Based Livestock Production

Other states involved: WV, PA, MD, NY

Production of a reference book dealing with livestock production based upon pasture resources. Includes 30 chapters and is coordinated by NRAES (Natural Resource, Agriculture, and Engineering Service). A comprehensive reference for producers, their advisors, allied industry, and various government agencies on this topic does not currently exist. All parties involved with pasture-based production enterprises benefit from this project. The main objective is to enhance efficiency and profitability of these livestock enterprises in the mid-Atlantic and northeast region. This project is not completed so results are not yet available.

Grape Production Training Program

Other states involved: MD, PA

Extension specialists in Virginia, Maryland, and Pennsylvania conducted three, one-day shortcourses in the represented states. Dates were 5 October 2001 (Wichester, VA, 57 attendees), 8 January (Howard Co., MD, 110 attendees), and 18 June (Lancaster, PA, 60 attendees). The content/goals of each shortcourse were similar. Attendees learned basic concepts of vineyard site selection, costs of vineyard establishment, and basic requirements for vineyard establishment and operation. The team-taught approach provided diversity but also illustrated the regional similarities of grape production techniques in the tri-state area. The program targets the sustained interest by beginning grape growers who seek information on vineyard establishment and operations. Specifically, the program addresses needs of new and interested producers who are entering the expanding grape and wine industry of the mid-Atlantic US. We move the program among the three states to make the program as physically accessible as possible. The programs are advertised in a variety of extension media, including hardcopy

and electronic newsletters and listserv-distributed communications. These basic or core shortcourses have been offered over 15 years and our goals have remained more or less constant over that period. Our goals are to provide – in a one-day program – the basic information that new and aspiring grape producers seek, as judged by the nature of questions these clientele ask. We occasionally ask attendees to complete written exit surveys; however, surveys were not used during this reporting period.

Southeast Greenhouse Conference and Trade Show

Other states involved: NC, SC, GA, FL, AL, TN

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

The Wheat Industry Resource Committee (WIRC)

Other states involved: Potentially all states with wheat production, approximately 22.

The WIRC is an ad hoc multidisciplinary structure. Extension specialists and researchers who work with the wheat industry have formed this alliance to share information on a continuous basis, and where appropriate to form partnerships for greater research or education efficiency. This group works with, and through, the National Association of Wheat Growers and has historically used the national convention and their summer workshop as an opportune time for interacting with the industry. In 1996, a Research and Education Forum modeled after the Beltwide Cotton Meetings was suggested that would provide a base for sharing information, interaction with the producers and processors, and enable a structure by which faculty could get recognition for research and extension articles being presented and shared. The first Forum took place in January, 1998 with a published proceeding. Since then the Forum proceedings have been made available on the internet, and accessible via the NAWG website.

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

Southern Region Pesticide Education Center

Other states involved: AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX

The Southern Region Pesticide Safety Education Center was developed by the Southern States to enhance pesticide safety education programs throughout the region by offering educational programs to pesticide safety educators in the region. The audience includes Extension agents, specialists, and both state and federal regulatory personnel. The Center is physically housed at North Carolina State University. NCSU sponsors two courses in Raleigh annually. These three-day workshops are preceded by an on-line instructional component developed by Virginia Tech. Enrollees participate in the on-line course prior to and as a condition to attending the workshop. The project addresses the need to provide the public with qualified trainers for teaching pesticide safety education to applicators in the southern states. The Center serves the needs of those states with inadequate resources to train their trainers in pesticide safety education. It also allows states

to avoid duplication of resources and share resources. The outcomes are to train trainers from Extension and regulatory agencies in the Southeast. Thus far, four workshops have been conducted with 160 participants. This has fulfilled expectations to train four groups in the two years of the Center's existence. This effort will continue in 2002 and 2003 to provide support for two additional courses. However, funding will stop in October 2002, ending a formal agreement to offer on-line courses. We will continue to work with NCSU and EPA to gain additional funds for the effort.

Southern Region Pest Management Center

Other states involved: AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX

The Southern Region Pest Management Center was developed by the Southern States to enhance pest management programs throughout the region. The Center offers a source of competitive grants to develop pest management information programs in the Southern States. It is also the focus of pest management programs and is one of four USDA funded regional pest management centers. The Center is physically housed at the University of Florida in Gainesville. Member states are developing crop profiles and regional and state pest management strategic plans. These documents are developed with stakeholder input to establish the pest management needs for various crops affected by the Food Quality Protection Act. The profiles and the plans are used by USDA and EPA to assess the continued registration of pesticides in the United States. It is critical to agriculture and specialty crops to have input into this process through these documents in order to protect their commodities and businesses from the possible loss of adequate and viable pest control tools. The project is built around stakeholder input. Nothing is done with the crop profiles and strategic plans unless stakeholders are involved in their development. The potential outcome of this project provides support to large and small farmers and specialty pest control areas. It allows the whole industry to have input where input was not available before. It also protects the food and fiber sources of the American population. The expected outcomes are clear and the potential impacts are definite. The project provides stakeholders a conduit to be involved in the decision-making process associated with the FQPA. The stakeholder committees established in this process result in documents established under the contract with the Center and USDA. They must meet established criteria. The impacts if done properly will meet expected outcomes as stated. In 2002, a pest management strategic plan was completed with North Carolina State University with peanut growers, specialists, research scientists, and agents from Virginia and North Carolina. As a result, this plan was published in July 2002 as the 18th plan completed nationally. This opens up this crop area for eligibility to apply for USDA research and extension funds, not previously available. Crop profiles were completed on tobacco, watermelon, and potato in 2002. Funds were secured for the second (2002-03) year of the project, which will support one project position and project development until April 2003.

Category 10 – Demonstration & Research Pest Control Manual Development

Other states involved: AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX

A Committee was organized to cooperate with the Southern Region States to develop and demonstration and research pest control manual – designed to train pesticide applicators certified in Category 10 – Demonstration and Research Pest Control. The committee met as part of the Southern Region Pesticide Safety Education Workshop – hosted by Virginia Tech in Roanoke in May 2002. The manual is critically needed by many States in the Southern Region. By pooling

efforts, we reduce the resources needed by any one state to complete the publication. The project serves to support the needs of Extension specialists, industry representatives, Extension agents, research scientists, and others who are required to be certified under state and federal pesticide law in their respective states. The benefits from their certification and training in this area benefits pesticide safety education programs throughout the South and thus all audiences. The expected outcomes are clear and the potential impacts are definite. The project provides a resource that would otherwise have to be duplicated by many states.

Safe Quality Food: Farm to Consumer

Other states involved: WV, NC, NY, WA

This project focuses on the development and implementation of a safe quality food system for the food industry. The target audience is dairy producers, apple growers, and produce growers. This food safety program builds on the principles of hazard analysis critical control system and is designed integrate safety and quality issues together. The project addresses food safety issues from farm to consumer that have been identified as important issues by stakeholders. These audiences are not specifically targeted in the project; however, they benefit from a safer food supply.

Development of Dairy & Animal Production Food Safety InfoBases

Other states involved: National

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

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

Investing in Healthy People—Multi-State Approaches to Heart Health

Other states involved: WV

Brief description: West Virginia and Virginia conducted a multi-state nutrition and health training in April 2002, entitled “Investing in Healthy People—Multi-state Approaches to Heart Health.” The training focused on the latest research and educational interventions related to heart disease and physical activities for families. This program was funded through the National Extension Association Family and Consumer Sciences 2002 Public Affairs Mini Grant Program.

It was targeted to Extension agents, paraprofessionals, and other community partners. A committee of stakeholders planned the event from both states. The majority of workshop participants work with underserved and under-represented audiences who participate in EFNEP and food assistance programs (Smart Choices Nutrition Education Programs).

EFNEP Cost Benefit Analysis Assistance

Other states involved: OK, NH, GA, OR, IL, IA

Brief description: In 1998, Virginia Cooperative Extension completed a cost-benefit analysis of the Virginia EFNEP. In 2000, a national satellite broadcast was conducted to train EFNEP personnel from other states on how to conduct a cost-benefit analysis. In the past year, Extension faculty from VCE have worked with six states interested in conducting cost-benefit analyses of their EFNEP.

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

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

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

Good Agricultural Practices (GAPs) is a program being developed nationwide through funding by the USDA-CSREES National Food Safety Initiative. It utilizes a practical, common sense approach to implement on-farm safety measures for safe fresh produce (vegetables and fruit) production. A HACCP-like (Hazard Analysis Critical Control Points) approach is taken to evaluate potential problem areas in pre-plant, planting, production, harvest, packing, storage and transportation phases of fresh produce by commercial grower/packers. The program is also relevant for direct market and pick-your-own operations. The primary focus is on prevention of problems as related to microbial contamination through human and animal introduction/contact, and emphasis on good documentation and record keeping practices. Currently, our commercial producers are facing pressure through contractual requirements of some produce buyers to provide evidence and documentation of their efforts to implement food safety measures on the farm. A key component of this documentation is attendance of GAPs educational sessions by the grower. Hispanic workers are a key target audience for the GAPs program. These training materials address issues important to their livelihood, as well as safety of their own families. They are the people group with the most intimate contact with farm-grown fresh produce, being involved in the harvest and packing of these commodities. Since most produced is marketed unwashed, workers are often the last to touch the produce before the consumer. This program seeks to bring education to these workers via on-site presentations, videos, and posters placed in the work areas. Some summary statistics on activities include: 25 agents trained in day-long workshop, 2 specialists attended update meeting, 430 growers received an introduction to GAP's, ranging in ½ to 1 hour in length, 27 commercial scale growers received extended training of 2-3 hours in length, 1300 Spanish brochures distributed, 2250 English brochures distributed, and 1350 Food Safety Begins on Farm booklets distributed.

Bioavailability of Waste Constituents

Other states involved: HA, WA, OR, CA, WY, CO, TX, OK, KS, MN, MI, IN, FL, PA

The focus of the project is to develop research-based educational materials and programs that enable regulators, local government officials, and citizens to make informed decisions regarding

the health and environmental risks of application of waste by-products. Concerns regarding the risks from heavy metals and excess nutrients addressed by the program are very important among local governments and citizens. The program provides research-based information that is valuable for protecting the rights of the under-served and under-represented communities, whose land is often adjacent to land application sites. Outcomes are largely research-oriented. These results are used by individual state extension programs to provide risk-based land application recommendations for regulators and local government officials. The Multi-state W-170 workgroup is primarily a research group, whose results are reported in the annual reports. The research has demonstrated that biosolids of sufficient quality can be used as a beneficial soil amendment and inexpensive fertilizer without generating environmental problems. Sharing of educational materials developed from the research is conducted during the annual meetings.

Powell River Project

Other states involved: WV, KY

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

Environmental Economics/Water Quality

Other states involved: MD, PA, DE, WV, NY, DC

The program deals with resource protection and enhancement in the 43,000 square mile Chesapeake Bay drainage basin including all or part of the five states and DC. The research and implementation program integrates protection and enhancement efforts in five major areas: living resource protection and restoration, vital habitat protection and restoration, water quality protection and restoration, sound land use, and stewardship and community engagement. Efforts deal with agricultural, rural areas, suburban areas and urban areas on an integrated basis. Resource conservation and conversion of resource lands (agricultural, forest and open lands) is a significant issue under the sound land use category. In June 2000, "Chesapeake 2000 - A Watershed Partnership" agreement was signed by the Governors of VA, MD and PA plus the Mayor of DC. This agreement provides a strong basis and direction for all federal, state and local resource related actions. Substantial citizen and stakeholder input influenced the development of the Chesapeake 2000 Agreement. Numerous citizen and stakeholder advisory committees will monitor and assist implementation of the agreement.

Commercial Vegetable Growers

Other states involved: MD, DE, NJ, PA

The purpose of this project is to facilitate the exchange of relevant information for the management of diseases of commercial vegetable production in the mid-Atlantic region, and to produce coordinated recommendations for effective disease management of these crops. The group meets several times each year to discuss research results, and once each year to modify and up-date the Commercial Vegetable Production Guide, VCES Pub. No. 456-420. This project provides the best, most current up-to-date information for managing the most important diseases of commercial vegetable production. The project provides information to all levels of commercial vegetable production.

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

Extension Cares for America's Children and Youth: Teens in Non-School Time Committee

Other states involved: KS, IN, IA, OH, MO, MN, CA, DE, IL, MA, NY, GA, AZ, MD, CO, NC, KY, ME, MS, NM, AL, WA, OR

The umbrella project is a national initiative of the Cooperative Extension System that improves child care and youth programs for infants and toddlers, preschoolers, school-age children and youth, and teens in out-of-school time. The Teens in Non-School Time Committee is currently developing a website that will serve as a teen program resource for those in the field. The idea for the website emerged via a survey of state contacts. The resources available through the project are designed for and will be accessible by all audiences. Program objectives and impacts have been identified and are available at

<http://www.reeusda.gov/extensioncares/docs/evaluation.pdf>

The plan for program evaluation has been completed and is available at

<http://www.reeusda.gov/extensioncares/evaluation.htm>

Because this evaluation is still in the piloting phase, no data is available at this time.

National 4-H Cooperative Curriculum System

Other states involved: AL, AR, AZ, CA, CO, DE, FL, HI, ID, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, MT, NH, NC, ND, NE, NY, OH, OR, PA, SD, TX, UT, VT, VA, WA, WI, WV, WY

N4HCCS is a collaborative effort of 4-H youth development programs at land grant universities in 41 states. State 4-H Leaders or their designees comprise the Board of Directors. A revolving Curriculum Committee consists of 15 state curriculum and youth development specialists, plus representatives from the National 4-H Supply Service, N4HCCS Board of Directors, and a National Program Leader from FHN/CSREES/USDA. An Executive Director and part time secretary are contracted. Accounting, contract work, and legal services are purchased. N4HCCS is organized as a 501c3 organization, a not-for-profit entity. Twenty-eight states have freely elected to join N4HCCS, in addition to the 13 original member states from the North Central Region. Each year State 4-H curriculum specialists area surveyed, and new design teams launched for all the highest priority topics. Product Premiers held just prior to NAE4HA Conference to introduce new products, and train key staff in their use, have attracted over 100 staff each year held. A 2002 web-based national survey of stakeholders showed high levels of

satisfaction with N4HCCS products and services. Since 1990, 4.7 million pieces of educational materials have been duplicated and sold. Millions of youth have enjoyed high quality, up-to-date curricula for their projects. Income since 1990 has been \$5.2 million. 2001 income exceeded \$1 million. More than \$2 million in grants to design teams have made the 130 products possible. About \$1 Million was expended in additional support to design teams beyond the grants. Each new product must pass juried review against the National 4-H Curriculum Criteria before being offered for sale. Hundreds of specialists, agents, and youth have served on Design Teams and in the process have learned a great deal. More than 50 Specialists have served a three-year term on the Curriculum Committee, an important staff development experience. Several states have agreed to have N4HCCS produce and market some of their state-produced products, saving money in the process. N4HCCS continues to introduce new ideas, techniques, and technology that benefit all of 4-H. One of the major criteria for jury process is to show impact of materials before they are accepted into the national collection. Each produced piece is evaluated for outcomes. These outcomes are available through the design teams of N4HCCS and the evaluation subcommittee of N4HCCS Committee.

Curriculum Development for Training Extension Advisory Leadership Groups

Other states involved: NC, AL

The focus of this project is to develop training curriculum to be used throughout the Southern Region to train Extension Advisory Leadership members and groups. Curriculum will cover orientation, roles and responsibilities, and, leadership, group facilitation and communication. The project will enable Extension staff to more efficiently engage stakeholders in the programming process. In addition, Extension advisory leadership members will develop necessary skills and competencies that will enable them to be contributing members of their leadership group. This curriculum will provide the necessary tools to increase diversity on Extension leadership and advisory groups. Agents and volunteers will be better able to provide needed information to potential volunteers and new members. The curriculum is currently being developed and piloted.

Healthy Indoor Air

Other states involved: Approximately 45 states nationwide

The Healthy Indoor Air for America's Homes Program was developed to provide basic but comprehensive information to consumers on how to get a handle on indoor air quality (IAQ) in their homes. The goal of the program is to educate consumers about sources, health risks, and control measures related to common residential indoor air problems and to help consumers reduce their health risks from these problems. In 2000, over 33,000 consumers throughout the U.S. reported adopting healthier IAQ practices: 2,437 families stopped exposing children to secondhand smoke, 3,491 families tested their homes for radon and 216 families mitigated their homes for radon, 4,159 families took action against carbon monoxide and hazardous combustion gases, 984 families dealt with problems associated with household sources of lead, 5,521 families reported reducing sources of moisture and biological hazards, 7,735 families selected and used household (cleaning, hobby, auto) products more wisely, and 6,981 families selected and used home pesticides more wisely to avoid IAQ-related health problems.

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

Institution Virginia Polytechnic Institute and State University
State Virginia

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

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

Gerald L. Jubb, Jr.
 Associate Director

2/17/03
 Date

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

Brief Summaries of Integrated Activities (Hatch Act Funds)

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

Economic Analysis of Price Discovery and Public Policy Issues in Concentrated Agricultural Markets

The pricing system in livestock has failed to coordinate production with consumer needs. Under cost-price pressure, the processing sector is consolidated and demand has decreased. The lack of producer-level profitability is prompting calls for increased market regulation. The purpose of this project is to provide research results on the economic causes of low prices and lack of profitability and help guide efforts to regulate firm behavior in the marketplace. Corrections for the demand problems have increased beef demand by more than 10 percent since 1998. Improved demand has added at least \$100 per head to fed cattle prices with at least \$50 per head reaching down to calf producers. If Virginia sells 400,000 calves per year, revenue to producers is up \$20 million due to the demand increase.

Improving Genetic Potential for Yield and Quality of Soybeans

High yielding new soybean varieties with disease resistance and improved seed quality are needed to keep soybean production profitable and to meet market demands. This project is developing soybean varieties that are well adapted to Virginia and surrounding states and possess resistance to viruses and soybean cyst nematode as well as improved quality traits such as low saturated fats (low palmitic acid), low rancidity-causing factors (low linolenic acid), higher protein and suitability for soyfood processing. Genetic resistance is the only practical way of controlling crop losses to viruses. The SMV resistant germplasm developed in this project will be of value to many other soybean breeders and ultimately will contribute to improved disease resistance in U.S. soybean cultivars. Soybean oil with low palmitic acid (low saturated fat) is considered a healthier alternative to regular soybean oil. Oil with linolenic acid is more stable in storage. Both traits are considered desirable by food processors who use large amounts of soybean oil. Decreasing the stachyose content of soybean seeds will increase the feeding value of soybean meal.

Pasture Systems for Horses: Development of Optimal Supplements

Ecologically sustainable agriculture requires dietary supplements for grazing animals to enhance the land as well as improve the performance of the animals. This project is developing a dietary supplement that improves the reproductive efficiency of grazing mares, ensures optimal growth and bone development of young horses, and minimises contamination of soil and water with nitrogen and phosphorus. Our novel feeds are rich in fibers and fat compared to typical equine sweet feeds, and they elicit much lower responses of blood concentrations of glucose and insulin, hence much less insulin resistance. Horses fed sweet feeds may develop a group of metabolic disorders comparable to syndrome X in humans who consume low fat, high carbohydrate diets for long periods. Thus we expect that use of the high fat and fiber feeds developed in our laboratory will reduce the risk of equine syndrome X, which includes certain forms of exertional rhabdomyolysis, laminitis and osteochondrosis.

Optimum Dairy Breeding Programs for Profitability

Dairy producers face tightening economic pressure in their operation. Genetic changes have their impact 5 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. The American Jersey Cattle Association has implemented the goal developed in this research for ranking its bulls. This has led to selection of sires that more nearly fit the current economic conditions than did the previous goal.

Management Systems for Improved Decision Making and Profitability of Dairy Herds

Management of heifers on the dairy farm has been under-researched relative to their cost of production. This cooperative research from several states is to determine the status of heifer enterprises in the U.S. and to develop recommendations to improve their nutrition, management and profitability. The replacement heifer enterprise in dairy businesses consumes about \$500/cow per year, 20 percent of production expenses, or \$5/100 kg of milk sold. Herds that have implemented management procedures and feeding recommendations to reduce calf losses from 15 percent to 10 percent have saved \$0.26/100 kg of milk, or \$5,000/yr for a typical 200-cow dairy business. Researchers in this project founded the National Heifer Growers Association in 1996. It now has 400 members dedicated to the efficient rearing of quality dairy replacement heifers in the U.S.

Seed Biology, Technology, And Ecology

Agricultural seeds are frequently treated with pesticides to control seedling diseases. Chemical seed treatments can harm the environment, are dangerous for farm workers, and add cost to seeds. This project investigates the natural immune system that seeds have to avoid disease. We are investigating naturally produced proteins that are involved in seedling disease resistance. Our research is identifying genes that are expressed in native terrestrial orchids that enable mycorrhizal fungi to interact and stimulate orchid growth and development. The basic information about orchid-fungal interactions that will eventually enable routine propagation of native terrestrial orchids by the nursery industry as novel new landscape plants while preserving endangered orchid species in Virginia.

Evaluation of Maize Germplasm for Resistance to *Cercospora Zeae-Maydis* Under No-Tillage Production

Cercospora zeae-maydis, a fungal pathogen that survives from season to season on infested corn debris associated with no-tillage practices, threatens grain losses ranging from 15 to 60 percent from gray leaf spot disease on 25 million acres of corn annually in the U.S. This project identifies, characterizes host response, and determines genetic inheritance of such resistance in corn germplasm to *Cercospora zeae-maydis*. Use of resistant germplasm to develop hybrids will prevent significant economic losses from gray leaf spot. Use of gray leaf spot resistant hybrids identified by this project saves Virginia corn farmers nearly \$15 million per year in potential grain losses due to GLS.

Environmental Effects on Herbicide Efficacy in Herbicide-Resistant Transgenic Crops and Weeds

Environmental factors may influence the expression of herbicide resistance in plants. This project will study the biochemical mechanisms of herbicide resistance in transgenic soybeans and herbicide-resistant weeds. The obtained results will provide farmers with valuable information on the influence of environmental factors on the performance of products of agricultural biotechnology that are currently marketed in the US. Understanding of the mechanisms of the development of weed resistance to herbicides is useful for the prevention of the spread of resistant weeds in new areas and for the more efficient utilization of weed control methods.

Effect of Crop Level and Fermentation on Chardonnay and Cabernet Sauvignon (*Vitis Vinifera L*) Glycosides

Profitability of grape growing is dependent upon maximizing yield while holding cost. Grape quality is largely dependant on aroma/ compounds which influence wine quality. The project exams the relationships between grapevine yield, aroma/flavor precursors and wine quality. The purpose is to better define the relationships between yield and wine quality under Virginia grape growing conditions. Also evaluated are methods of extraction of aroma and flavor precursors from the grape during fermentation. This research quantifies the changes in glycosides (in part, aroma/flavor precursors) which occur as a result of several processing variables.

Sweet Corn And Melon Production In Southeast Virginia Using Plasticulture

Management practices for melon and sweet corn production to meet specific market windows must be developed for vegetable growers in the coastal plains of Virginia. Production systems using drip irrigation, plastic mulch, and row covers will be used to determine how early these crops can be planted and harvested. It is expected that this research could change the way melon growers plant and grow muskmelon and watermelon in Virginia. The use of row covers could increase the yields significantly for a given unit area of field used, decrease the per unit production cost, and increase the profit for an acre of melons.

Improved Weather-Based Advisories and Disease Management Inputs for Peanut Production

Improved weather-based, disease advisories are needed to maximize the efficiency of peanut production in Virginia and reduce the dependency on fungicides. To reduce the need for fungicides and improve the net profits of peanut production in Virginia. Early leaf spot and Sclerotinia blight advisories, soil temperatures, heat unit reports, and frost advisories were reported on the Peanut/Cotton InfoNet (www.ipm.vt.edu/infonet) and regional advisories were recorded daily on the Virginia Peanut Hotline (1-800-795-0700). The Peanut/Cotton InfoNet was accessed 1808 times from March thru 10 November 2002, and the Peanut "Hotline" logged 1745 calls from May thru October. The Virginia leaf spot advisory saved two sprays of fungicide compared to seven sprays on a 14-day schedule in other states. At an average cost of ca. \$32/ha for each application, the advisory saved peanut growers \$1.5 million dollars in production of 23,473 ha of peanuts in 2002. Adoption of the R3-advisory program for management of foliar diseases can reduce costs in Virginia an additional \$32/ha or as much as \$751,123 in 2003. Frost advisories in 2002 enabled many growers to avoid penalties for freeze

damage to kernels. Without freeze damage, Virginia-type peanuts had a value of \$353/ton in the fall of 2002. Freeze damage reduced this value to \$140/ton.

Development of New Soybean Production Strategies to Improve Mid-Atlantic Cropping Systems

Production costs of the Mid-Atlantic crop producer need to be lowered in order to compete in the global market. This project examines methods to preserve or improve soybean yield in new, more profitable cropping systems of the Mid-Atlantic region. Assuming that early-maturing varieties are used on 5 percent of Virginia's double-crop acreage, increasing seeding rates to appropriate levels could result in yield increases with a net worth of over \$400,000 annually. By increasing plant population on lower water-holding capacity soils to increase leaf area and decreasing seeding rates on higher water-holding capacity soils (leaf area would still be above levels needed to maximize yield), one may realize yield increases worth approximately \$700,000 and seed costs savings of approximately \$500,000, annually. The ability to rapidly and economically access leaf area variability in large field and farmsteads via remote sensing would greatly aid the implementation of leaf area-based soybean management strategies.

Microirrigation Technologies for Protection of Natural Resources and Optimum Production

This research addresses the use of limited water resources without water quality degradation. The purpose is to provide commercial agriculture and others the scientific information needed to promote natural resource protection and optimal crop production. According to these test results more melons and heavier melons can be produced in the Tidewater region of Virginia, using deep well water than using surface irrigation pond water. However, Na and K levels will be higher in melons watered with deep well water in the Tidewater area of Virginia.

Dynamic Soybean Insect Management for Emerging Agricultural Technologies and Variable Environments

Plant growth of double-drop soybean, which comprise two-thirds of the total acreage in Virginia, is limited by late planting. Leaf feeding insects may be causing a much larger yield loss than current thresholds indicate. Thresholds are being reevaluated. New research shows that total leaf area is highly related to yield and when measured, may be an effective way to determine if fields should be protected from further leaf loss, thereby improving soybean yields. Soybean aphid, *Aphis glycines*, was discovered in 2000 in many mid-western states and western-most West Virginia. It is capable of causing significant yield reductions of up to 50 percent if infestations occur early and are left untreated. In 2001, aphids were detected in 24 counties but they occurred late in the season (September) and most populations were characterized as low level. In 2002, aphids were found in 16 fields in 12 counties in late August to early September. Results indicate that soybean aphid may never present an economic threat to Virginia soybean. Its overwintering hosts, plants in the Buckthorn family, are not common in Virginia and these late season migrants should never be able to build to high enough levels in time to cause significant plant damage.

Control of Diseases of Tree Fruits

Fifteen or more major diseases impact apple and peach production in Virginia. Disease management research focuses on evaluation and proper timing of materials and practices for

broad-spectrum disease control and testing of novel methods for managing fire blight. Ongoing evaluations help to determine the most appropriate alternatives for disease management. The goals of this project are to develop effective programs for control of diseases of fruit and foliage of apple, peach, and nectarine and screen for resistance to other diseases in scab-resistant apple cultivars. Ongoing fungicide evaluations are essential to tree fruit disease management in view of the development of resistance to current materials and potential loss of older, useful materials through withdrawal of registration. The heavy fire blight infection year in Virginia in 2002 reiterates the need for ongoing testing of new materials and novel approaches such as the use of the PGR, Apogee for suppression of this devastating disease.

Multidisciplinary Evaluation of New Apple Cultivars

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

Applied Ecology and Management of Tomato and Potato Insect Pests in Virginia

Insecticide applications used for managing insect pests of tomato and potato are often made based on the anticipated presence of the pest or on its mere presence alone. This project investigates the development of action thresholds for insect pests of tomato and potato. An action threshold is the greatest density of the pest at which time a control decision can be made without economic loss. Demonstration of potato's ability to tolerate high levels of injury by European corn borer in most years coupled with scouting and use of action thresholds has resulted in a reduction of insecticides applied on potato in Virginia. Based on these reductions and typical prices for fresh-market tomato, the loss in return per hectare in an untreated tomato field was estimated to range from \$3,015 to \$17,883 in the spring crop and \$2,555 to \$11,074 in the fall crop. Identification of the major insect pests of tomato could result in a reduction in the number of insecticide applications used on tomato. Results from this research justify the need to develop and evaluate scouting procedures and economic thresholds for each of these major pests in order to improve the existing tomato IPM program in Virginia.

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

Viruses of Soybean and Selected Crops and Molecular Basis for Virus Diversity and Pathogenicity

Viruses infecting crop plants reduce yield and quality and, if recognized, can be controlled by resistance or management practices. This project identifies viruses infecting soybean and other crops, host resistance responses, cellular and molecular bases for resistance, and virus

epidemiology. Appearance of new, resistance-breaking strains shows the need for new strategies to maintain durability of resistance, and prevent increased losses from synergy of dual infection with SMV and BPMV. Sequence analysis of diversity will allow rapid detection of these strains. The role of viruses in causing losses in quality by discoloring seed coats was demonstrated, a very undesirable feature in food-grade soybeans.

Destruction of Clostridium Botulinum in Foods at Minimal Processing Temperatures

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

Processing and Packaging Innovations to Control Pathogens, Spoilage Bacteria, and Molds

Certain processing and packaging procedures can be used to control the growth of microorganisms. This project is designed to identify processing techniques to make foods safer. The results are positive for use of hydrogen peroxide and possibly organic acids as antimicrobials in fruit juice. The addition of organic acids and hydrogen peroxide can be used to reduce Cryptosporidium in fresh juices. It would be possible to help determine a process that smaller processors could use. Sensory evaluation of the fresh juices would dictate that the process be designed with sensory as a factor.

Microleak Detection and Sterility Maintenance Assurance for Aseptic Packages

There are not suitable methods to test new food packaging for leakers and possible spoilage before it reaches consumers. The purpose of this project is to define the minimum size at which a leak can cause spoilage in packaged foods in relation to distribution and handling conditions. Testing of foods with a wide variety of surface tensions resulted in establishing two microns as the absolute threshold leak size for liquid foods. However, evaporation will almost certainly exceed flow in this threshold size and result in a plugged defect. Air filled leaks were less likely to cause loss of hermetic seals.

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. As a result of the program, fresh scombroid and scombroid-like fish and their products should be introduced into the market that are safe and wholesome. A rapid method for

the quantitative analysis of specific biogenic amines (histamine, cadaverine, and putrescine) would be useful to both industry and government. Decisions on product safety could be determined in less than three hours.

Integrated Management of Late Blight and Early Blight Diseases in Potato in Virginia

Late blight and early blight are two important diseases which reduce potato production and quality. The purpose of this project is to develop disease forecast systems for predicting presence of these diseases in potato fields, and to reduce the amount of fungicides required for control. Local potato growers were able to access both the Tomcast and Blitecast disease-forecasting programs by computer. Use of the disease forecasting software programs Tomcast and Blitecast for the management of early and late blight disease of potato can save area growers an estimated \$65 to \$75 per acre on fungicide costs and reduce chemical inputs by thirty percent.

Antimicrobial Resistance of Campylobacter and Salmonella in Turkeys on Farms

Turkey production disease control can lead to antimicrobial drug resistance. These studies will focus on the design of on-farm strategies for control, prevention, and/or eradication of foodborne disease, and prevention of transfer of antimicrobial resistant foodborne disease from turkeys. This study provides guidance in determining sampling and testing approaches to determine the *Campylobacter* spp. colonization status of turkey flocks. Also determined is variety and virulence of *Escherichia coli* and antimicrobial resistance patterns when either treating disease colibacillosis or evaluating potential for transmission of antimicrobial resistance through the human food chain.

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

Food Demand, Nutrition, and Consumer Behavior

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

Increasing The Productivity of Livestock Through Integrated Genetic Evaluation Systems

Livestock genome projects provide data on differences in the genomes of individuals. This project develops genetic evaluation systems that incorporate such differences, in order to more accurately select superior breeding animals in genetic improvement programs. This research is aimed at identifying genes and gene networks affecting traits of economic importance in farm animals and plants. Such knowledge will result in more accurate selection and genetic

manipulation to achieve desirable genetic changes. It will advance our understanding of the genetic architecture of quantitative traits.

Quality Assessment and Processing of Value-Added Fluid Dairy Emulsions

Dairy ingredients used in developing value-added dairy products have different functional and chemical characteristics than dairy components within a natural dairy emulsion. The purpose of this project is to understand how the different functional and chemical characteristics affect heat stability and shelf-life characteristics of value-added dairy emulsions. Yogurt is a viable delivery system for conjugated linoleic acids, which have been found to suppress atherosclerosis, reduce body fat mass, and increase lean body mass in human and animal models, providing another benefit to consumption of dairy products.

A Bilayer Coating to Extend Quality Characteristics in Unprocessed Fruits and Vegetables

Maintaining saleable quality in fresh fruit and vegetables has been a challenge. Single base coatings have been used to improve appearance, but are not effective in maintaining quality features in fresh produce. 1. To develop a bilayer coating to maintain and extend quality characteristics in fresh fruit and vegetables. 2. To monitor quality changes in fresh produce with the aid of a bilayer coating. The formulated coatings could serve as a resource for extending and maintaining shelf-life for perishable fruit and vegetables.

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

Economic Evaluation of Agricultural Research

Evaluations of agricultural research and education are needed to assess the value of particular technologies and institutional changes, and to help guide research and education resource allocation decisions. This project develops and applies methods to evaluate the economic impacts of agricultural biotechnologies, integrated pest management programs, and agricultural policy research.

Watershed Scale Assessment of Environmental Impacts of Precision Farming

Agricultural chemicals are considered to be the major cause of water quality problems in the Chesapeake Bay. There is a need to develop new technologies for reducing the losses of nutrients from agricultural areas. This project examines the use of precision farming as a management practice for reducing pollution from agricultural lands. The purpose of this study is to investigate the impact of precision farming on the surface water quality and on crop production in the Atlantic coastal plains. The study results indicate that precision farming could be used as a viable management practice in the Chesapeake Bay Watershed to achieve the goal of 40 percent reduction in nutrient losses to the Bay. However, further research should be conducted to evaluate the economic feasibility of precision farming in the Chesapeake Bay watershed.

Impact of Treatment on Soil Suitability for On-Site Wastewater Treatment and Disposal

Many soils are not suitable for onsite wastewater treatment and disposal systems and increase the potential for biological and chemical degradation of water. This project examines the potential for high quality wastewater to overcome soil limitations to wastewater renovation. Information on the relationship between effluent quality and soil and site properties are of economic

importance to Virginia. These findings will assist in making decisions on the suitability of home sites for onsite wastewater treatment systems as influenced by effluent quality and the associated public health and environmental quality implications.

Mineralogical Controls on Colloid Dispersion and Solid-Phase Speciation of Soil Contaminants

Heavy metal soil contaminants must be managed indefinitely because they are not degraded nor converted to volatile forms, and their bio uptake is low. However, heavy metal transport by colloids to surface and ground waters can deteriorate water quality. Evaluating soil mineralogical and chemical properties will provide mechanistic insights that are useful for determining mobilization of soil colloids and managing the impacts of soil contaminants to water quality. Substantial increases in livestock production densities (particularly poultry in Virginia) and subsequent manure-P loading rates on soils has increased the risk of surface and groundwater P contamination from these sources. Soil test P (Mehlich-1) has been extensively examined to determine threshold levels for crop fertilizer recommendation but not as an environmental P risk assessment. The degree of P saturation (DPS) of a soil, is more complex to analyze but more useful as an environmental P risk assessment. We correlated Virginia's Mehlich-1 P soil test with DPS and incorporated it into the Virginia P index, enabling Virginia to comply with state regulations.

Nutritional Systems for Swine to Increase Reproductive Efficiency

Sow nutrition research requires large numbers to get valid data. Improved nutrition of reproductive sows could lead to enhanced sow performance and thus reduced cost of production. The effectiveness of increasing dietary lysine for high-milk-producing sows will be evaluated. The value of injecting a high level of vitamin A at weaning and breeding on sow performance will be assessed.

Adjuvant-Herbicide-Plant Surface Interactions Affecting Herbicide Action, Fate, and Selectivity

Weeds cause great economic losses in the U.S. Herbicides are essential tools in combating the problem but may cause environmental concerns. Goals are to improve efficiency at lower rates and to minimize their impact on the environment. Evaluate herbicide-adjuvant-plant interactions that may influence herbicide deposition, uptake, fate, action, and selectivity. Determine sites and modifying effects of certain adjuvants on herbicidal action and plant response, including root exudation and allelopathy. The results are useful toward improving efficiency and reducing herbicide use rates, thereby minimizing groundwater contamination and environmental impact by chemicals.

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

Rural Economic Development: Alternatives in the New Competitive Environment

Rapid economic change and devolution of responsibilities is forcing rural communities to address problems of poverty, underemployment, and opportunities for disadvantaged citizens in new ways. These problems have implications for other government functions such as providing public services and stimulating economic development. The purpose of this study is to examine

how federal and state welfare reform policies affect local governments and suggest ways that localities can assist the process of transition from welfare to work. Recent economic downturns are not as likely to induce a substantial increase in program participation; this saves state and federal resources. Food stamp participation can be enhanced (and well being improved) through better advertising and information provision.

Annual Survey of Quality of Life in the Commonwealth Of Virginia

The quality of life in Virginia, as perceived by its citizens, requires continued monitoring for establishing trends and for consideration in proposing public policy. This project provides continuing "baseline" statistics and trend data for monitoring public perception of the quality of life in Virginia. Numerous Virginia governmental agencies request copies of the report for use in policy-making -- including the Governor's office, State Council on Higher Education, Department of Health and Human Services, Department of Transportation, Department of Education, and the Attorney General's office. Planning District Commissions throughout the Commonwealth also subscribe to these reports, and a special report was prepared in 2002 for the Northern Shenandoah Planning District Commission. Faculty members use the results in research projects and in strengthening proposals for research funding to study various topics.

Osteoporosis and the Health of Virginia's Older Women: Issues and Consequences Affecting Quality of Life

The lifestyles of older women are physically, psychologically, socially, and economically challenged by their health problems. This project examines the health and well-being of older women living in southwest Virginia. The purpose of this study is to examine the functional, psychological, and social consequences of living with health conditions, such as osteoporosis and chronic pain, and to identify management strategies the women use to maintain a satisfying quality of life. Approximately 200 professionals and 100 community residents attended presentations on rural older women's health issues during the reporting year. Information from the project also was shared with 20 Extension agents as part of an in-serve training program. An article highlighting the findings of the larger study appeared in *Aging Today*, the bi-monthly publication of the American Society on Aging (ASA). This publication is sent to the 6000 gerontological researchers, educators, clinicians, and practitioners; the article also is available to the general public through the ASA website.

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

Institution Virginia Polytechnic Institute and State University
State Virginia

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

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

Steven H. Umberger
 Director

2/17/03
 Date

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

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

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

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

Other states involved: KY, TN, NC

We are establishing crossbred lines combining Holstein and Jersey breeds at two stations, Virginia Tech and Kentucky. North Carolina will likely participate with crossbred cattle, while Tennessee will cooperate with collection and analysis of field data. Our objective is to create diallele crosses of Holstein and Jersey breeds, with purebred controls, where purebred parents contribute genes equally to all four breed groups, JJ, HH, JH, and HJ. Our intention is to produce 35 to 40 females per breed group at Virginia Tech, 20 females per breed group at Kentucky, and (subject to approval of the project by NC State faculty) about 12 to 15 females per breed group at North Carolina. Dairy producers face increasing challenges in health and fertility of high producing dairy cows. In addition, Holsteins are disposed to dystocia especially at first calving and both Holsteins and Jersey purebreds display increasing amounts of inbreeding as within breed selection continues. Dairy producers are practicing crossbreeding, but research results based on modern genetics are unavailable, as the last crossbreeding trails in the United States were completed in the late 1960's. Our project will measure heterosis and breed additive genetic merit in many traits, including disease incidence and calfhood survival, estrus behavior and fertility, production in mature animals and longevity. These issues will contribute to our understanding of challenges facing dairy farmers who wish to continue managing pure breeds as well as those who wish to milk some crossbred cows. One under-represented audience of dairy producers consists of grazers or managers interested in intensively managed rotational grazing systems combined with confinement feeding systems. This group of producers has greater need for reproductively efficient dairy cows than do producers using more traditional dairy management systems. Our project specifically addresses some of the needs of this group. There are no results at this point. First matings were made in the Virginia Tech herd in August of 2002, and no matings have yet been made at Kentucky at North Carolina. Semen for matings has been procured and is available to cooperating institutions.

Cut Holly Production

Production of deciduous and evergreen holly for harvest as a cut crop for decorative use has been investigated. Production and marketing assistance is available. New or alternative crops for agricultural producers, whether new or established are critically needed. These type of crops can be grown and marketed by minority farmers. The number of growers and acreage in the program is informally monitored. A series of seven extension publications was written detailing various production and marketing aspects (www.ext.vt.edu - Resources - Nursery Production - Virginia Cut Holly Production). These publications are used both in Virginia and nationwide. An initial estimate of 10 growers has now doubled to at least 20 over the past 8 years.

Peanut Production and Management

Other states involved: NC

The focus of this project is on the integration of research and extension activities for improvement of peanut production and management. Annual formal planning sessions are held to discuss critical issues confronting the peanut industry of the V/C peanut production region. Production and marketing issues are addressed and educational programs developed for all segments of the peanut industry in the V/C peanut production region. Outcomes are evaluated through compilation of annual reports of local extension agents. Breeding programs are oriented to address yield, disease problems and quality issues. Pest management advisories are coordinated across state lines and crop management educational programs are developed to address current issues. Crop management advisory programs are utilized by adjacent states (Example: harvest-frost advisory prepared by Va Cooperative Extension utilization by NCSU Cooperative Extension).

Development of Pest Management Strategies for Forage Alfalfa Persistence

Other states involved: IL, IN, KY, MD, MI, MN, MO, NE, NY, OH, OK, PA, SD, WI, WY

Stresses such as unfavorable growing conditions, interference by weeds, and injury by pests significantly shorten alfalfa stand life. The goal of this project is to improve persistence of forage alfalfa stands by implementing ecologically-based pest management strategies. The project addresses a recognized concern among alfalfa growers about the lack of stand persistence. The extent to which the project addresses the needs of under-served and under-represented audiences is not known. Project outcomes and impacts are identified and documented in the NC-226 report submitted annually to CSREES (see AD-421 Progress Report).

Wine Grape Cultivar, Clone and Training System Evaluations

Other states involved: NY, NC

This is a collaborative research and extension project with personnel in New York State and North Carolina to evaluate performance of grape cultivars and clones under growing conditions of NYS and VA. The physical conduct of research is in VA and NY; however, North Carolina has participated by partial funding of the research. Preliminary information from the research has been shared with the wine industries of NYS, VA and NC via extension meetings. The project is long-term, but early results of grape cultivar evaluations have been shared with industry in New York, Virginia, and North Carolina. The research addresses strategic issues of the eastern US wine industry, including how grapevines should be trellis and trained for optimal yields and quality, what cultivars are appropriate for the eastern Piedmont of Virginia and North Carolina, and what clones of specific cultivars perform best in New York and Virginia. We anticipate that the knowledge generated from this collaborative effort will have impact throughout the eastern US. Research conducted at the Southern Piedmont Research and Extension Center in Blackstone VA is specifically aimed at providing varietal recommendations for the eastern Piedmont of VA and NC. Clientele in this region are interested in grape production as an alternative to tobacco or other agronomic crops. The easiest approach is to use annual National Agricultural Statistics Service data to show trends in adoption of specific cultivars within states and regions of states. We have issued industry surveys in the past to assess the adoption of cultural practices (such as training systems), and such surveys will be used once we have summarized research data and issued recommendations. Project is in preliminary stages, and it would be difficult to provide meaningful indicators of impact at this point.

Regional Project NC-213 Production, Marketing and Delivery of Quality Cereals and Oilseeds

Other states involved: Potentially all states with wheat production, approximately 22.

The mission of the NC-213 is to foster interdisciplinary and interregional partnerships that will assist all sectors of the grain industry to preserve and enhance the quality of U.S. cereals and oilseeds. Identifying, preserving, and closely matching grain quality with specific end-user needs promote economic growth and global competitiveness. Participants represent bio-engineering, entomology, pathology, grain science and industry (Kansas State U.), crop science, and USDA-ARS. This regional research group has strong links with industry, and has an established endowment from the Andersons (grain industry) which funds administration of the project and approximately \$100,000 per year in research projects, plus a new endowment team research project.

Development and Implementation of a Risk Index for Reducing Insecticide Use for Control of Southern Corn Rootworm in Peanut

Other states involved: NC

Southern corn rootworm (SCR) is an annual soil pest of peanut in VA and NC, and an occasional pest in SC, GA, OK and TX. Larvae feed in the soil on developing pods, which reduces yield, and allows entry of secondary pod diseases that affect nut quality. Because it is a soil pest, detection is difficult and many producers make preventive soil insecticide treatments with no knowledge of actual pest abundance. Project research showed that much of the peanut acreage is never actually infested by rootworm, and infestation level is influenced by several factors such as soil type, pest history, and cropping practices. These factors have been integrated into a risk index that identifies fields at risk for rootworm damage to peanut pods so only those fields are treated. Over the past four years, cooperating with growers and VA and NC Cooperative Extension Agents, the index was evaluated on 198 peanut fields in VA and 184 in NC.

Development and Testing of a Phosphorus Index for Site-specific Nutrient Management Planning

Other states involved: MD, DE, PA

This integrated research and extension program seeks to develop and test a decision aid for field-specific assessment of phosphorus loss potential. Farmers are under increasing pressure to plan animal waste applications according to the phosphorus loss potential of each particular field on a farm. This tool will permit them and the nutrient management planners working with them to assess site-specific phosphorus loss risk and adjust nutrient management plans accordingly. The program focuses primarily on livestock farms, whomever may be the operators.

Farm and Power Dealerships in Marketing Equipment

Other states involved: DE, MD, WV, NC, SC

Beginning in 1990, the Virginia Equipment Dealers Association merged with the Delmarva Power and Equipment Association, and soon after with the Carolina Power and Equipment Association. The surviving entity is known as the Eastern Equipment Dealers Association. The Virginia dealers developed an education committee and a formal program beginning in 1973. The Eastern Association accepted the program of work began earlier and operates the educational program based on a dealer education plan with five strategic objectives based on forty defined problems at the firm level. With one exception in forty years, an annual dealer

management conference is held for owners and managers in a six state region servicing the farm and power equipment industry.

Mid-Atlantic Cropping Systems

Other states involved: MD, NC, PA

This activity involves field research and in-depth studies to evaluate the impact of three cropping systems on crop productivity and soil quality. Extension education and field days are a continuous part of the plan of action. Stakeholders are interested in improving their ability to compete at current world prices. There is also extensive and intensive interest in the impact of changes in cropping systems on nutrient movement through soil. This project addresses both of these issues. This project and the information is presented at numerous area agricultural meetings that are well attended by under-represented audiences.

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

In-Season Monitoring of Resistance and Species Composition to Aid in Management of Heliiothines in Virginia Cotton

Each year, cotton growers in Virginia are faced with making decisions regarding management and control of Heliiothine pests (cotton bollworm and tobacco budworm). Lint losses that result from poor or inadequate control have ranged from 60 to 326 lb per acre in the period from 1994 to 2001. Most growers gain adequate to excellent control in conventional cotton using a series of two pyrethroid insecticide sprays, or in bollgard cotton, using a single application. Both the timing of spray applications and good efficacy of products are critical to the continued success of these worm control systems. The work presented here details the in-season research and extension processes for gathering and extending information critical for maintaining efficient control programs. The Heliiothine complex is capable of causing significant yield reductions if not managed. This project is important for maintaining the most efficient cotton insect pest management program and includes in-season monitoring of pest population levels, evaluating the degree of insecticide resistance to pyrethroid insecticides, and monitoring the proportions of the two Heliiothine species. This program impacts many peanut growers, across all audiences. All cotton growers and Ag-related support industry personnel have equal opportunity to participate in information exchange with the project leader, and opportunity to attend information updates. Meetings are designed to coincide with when growers can attend without interfering with major farming activity periods. Project results are summarized in a variety of media to accommodate both computer and non-computer based clientele. A total of 7,200 ears of corn were sampled in mid to late July 2002 from 146 corn fields in 29 counties in Virginia to determine corn earworm larval population levels – and to make predictions regarding sequential infestation levels in cotton, soybean and peanut. An average of 45 to 75% of the ears sampled were infested with larvae or showed signs of damage, depending on region, which was up considerably from 2001 levels. Predictions were that growers could expect moderate to high infestation levels. Potential for insecticide resistance was evaluated using vials pretreated with either cypermethrin at 5 or 10- μ g rates, spinosad at a 15- μ g rate, or untreated (control). A total of 1,147 moths were captured live in mesh pheromone traps from June 25 through September 5 from two locations and placed into pretreated vials. An average of 5.0, 1.7, and 5.5% survived the 5 and 10- μ g cypermethrin and 15- μ g spinosad rates, respectively, which was similar to results from 2001, but lower compared with results from 2000. Heliiothine eggs were collected from commercial cotton

fields on 20 different dates from July 24 to August 30 and subjected to the Agdia Hel-ID egg testing procedure to determine the species. Tobacco budworm comprised about 29 to 80% of the total tested in July, dropped to about 5% in mid August, and increased to about 14% towards the end of August. A total of 618 Heliothine larvae were collected from peanut, soybean and cotton fields from August 9 to September 13 and identified to species in the laboratory. Over all sample dates, only 5.0 and 4.0% collected from peanut and soybean, respectively, were tobacco budworm, with the remainder being corn earworm. However, the proportion of tobacco budworm varied from 0 to 11%. These data and the insights they provided were extended to growers and used to improve in-season worm management practices.

Management of Tomato Spotted Wilt Virus in Peanuts

Other states involved: NC

Incidence of tomato spotted wilt virus (TSWV) is increasing to epidemic proportions in VA and NC peanut. Many more fields were infected in the 2002 field season compared with previous seasons. Entomologists, agronomists, and plant pathologists are cooperating to develop a research-based system for disease management. A series of field experiments was conducted in 2002 to evaluate factors that influence TSWV including insecticide usage, row spacing, plant population, planting date and variety. Results are being used to develop a risk index that combines these factors into systems that will allow growers to minimize disease incidence and losses. TSWV is a relatively new disease in Virginia peanut and has reached epidemic proportions. Without some form of management, this disease will cause significant yield reductions across many fields and farms. This program impacts many peanut growers, across all audiences. All peanut growers and Ag-related support industry personnel have equal opportunity to participate in information exchange with the project leader, and opportunity to attend information updates. Meetings are designed to coincide with when growers can attend without interfering with major farming activity periods. Project results are summarized in a variety of media to accommodate both computer and non-computer based clientele. The hoped for outcome of this work is to provide a disease management system that will allow growers to minimize the incidence and impact of TSWV in peanut. No systems are currently in place to document the impact, i.e., the level of adoption or reduction in disease impact. A brochure that presents the index for reducing TSWV incidence and losses is being worked on cooperatively by scientists at both Virginia Tech and NC State. A final draft is expected to be completed in time for planned winter educational meetings and will be explained and distributed to growers.

Rootstock and Interstem Effects on Pome and Stone Fruit Trees

Other states involved: AR, CA, GA, IA, IL, KS, KY, MA, ME, MI, MO, MN, NC, NJ, NY, H, OR, PA, SC, SD, TN, UT, VA, WA, WI

With the increasingly competitive international market, the growing demand for higher quality fruit by consumers, the strong pressure to reduce chemical use, and an ever increasing need to enhance the economic efficiency of production, tree-fruit growers must look to alternative economically and environmentally sustainable management strategies for production. Growers who want to stay profitable must establish high-density plantings with much smaller trees with new scion cultivars. These high-density plantings may cost several times more to establish than low-density plantings, thus greatly enhancing the economic risk. Rapid returns are also vital for providing the ability to change cultivars in response to market or genetic opportunities. The central component of high-density systems is the rootstock. The root system imparts many

characteristics to the mature tree such as size, precocity, productivity, fruit quality, pest resistance, stress tolerance, and thus profitability. As the industry moves from low- to high-density plantings, several rootstock-related problems must be addressed. New pome- and stone-fruit rootstocks cannot be recommended to commercial growers without reservations until there is sustained research as to soil and climatic adaptability, root anchorage, size control, precocity, productivity, pest resistance, and propagation ability. In general, field-testing of rootstocks in an orchard setting requires a minimum of ten years to assess accurately the potential for improved profitability, reduction of inputs, and enhancement of production efficiency. With year-to-year variation in weather, this time span is necessary to obtain a true indication of rootstock performance. The expected outcomes include the identification of superior rootstocks that can be recommended for commercial planting. The expected impact is that adoption of these new superior rootstocks will improve fruit production and orchard profitability. Results are published in refereed journals, trade journals, and newsletter, and they are presented at professional meetings and at Extension meetings. A website is maintained to post meeting minutes, annual reports, and resulting publications for the general public. <http://www.nc140.org/default.html>.

Beltwide Cotton Seedling Disease and Nematode Control

Other states involved: NC, SC, GA, FL, TN, AR, AL, MS, LA, TX, AZ, NM

Scientists cooperate in research to identify disease problems and evaluate strategies for their control in each state. Protocols for cooperative research are defined and reports are presented annually at meetings in November or December. Through coordinated efforts and sharing results, this group provides the U.S. cotton industry with information to maximize the efficiency of disease control. Disease control investigations include cultural practices, variety selection, and chemicals as tools for improving disease management. The findings contribute to improvement of programs in Integrated Pest Management and minimize the dependency on chemicals for disease control. On-farm demonstrations are conducted in grower fields where one or more diseases are threatening the sustainability of cotton production. The location of these trials is determined by the occurrence of disease. Several states use these on-farm applied research trials as a stage for growers to learn about important diseases and gain “hands-on” experience in disease recognition and strategies for disease control. The primary outcome or impact expected for this cooperative program is an improvement in the efficiency of crop production; be it an increase in yield and quality, and/or a reduction in the cost of production. Results of applied research are summarized in written reports annually to the Cotton Foundation, the Virginia Cotton Board, and the State Support Committee of Cotton Incorporated. Additionally, the results are discussed by extension specialists at county-wide grower meetings each winter. The findings are used to update and improve disease control recommendations in publications such as the Virginia Cotton Production Guide, and the Virginia Pest Management Guide. Impacts have included a realization that new seed treatment fungicides are strong enough to allow eliminate application of in-furrow fungicides, which were routinely used by growers at a cost of 12 to 15 dollars per acre. Most recently, data from 2002 will arm growers with the knowledge and confidence needed to use variety selection as a means to reduce yield losses to southern root knot nematode in Virginia and other states. This information was not previously available to growers.

Development of Dairy & Animal Production Food Safety InfoBases

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

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

Application of Hazard Analysis Critical Control Point (HACCP) Principles as a Risk Management Approach for Exotic Pathogen Control in Aquaculture

Other states involved: SC, MS

The preventive paradigm of HACCP was applied as a risk management tool for three different situations to reduce the potential for negative impacts on wild fishery stocks and protected resources. HACCP is designed first to identify steps or processes that have a potential hazard associated with them (i.e., Hazard Analysis), and then define how these hazards can be mitigated (e.g., establishing Critical Control Points, Establishing Critical Limits, Monitoring, Corrective Actions, Verification Activities, and Record Keeping). This project addressed a high priority for the shrimp aquaculture and processing industry and for the natural resource regulatory agencies. This project provides information to help protect our natural resources from the potential threat of viral pathogens. The information from this project is currently being used by the South Carolina Waddell Shrimp Mariculture facility as a basis for their biosecurity program at their facility. Results include: (1). A book chapter entitled: "Preliminary application of Hazard Analysis Critical Control Point (HACCP) principles as a risk management tool to control exotic viruses at shrimp production and processing facilities" was published in *The New Wave: Proceedings of the Special Session on Sustainable Shrimp Farming*. 2001. (Browdy and Jory, eds.) World Aquaculture Society. Pp. 279-284. (2)., A publication entitled: "Application of Hazard Analysis Critical Control Point (HACCP) Principles as a Risk Management Tool to Control Viral Pathogens at Shrimp Aquaculture Facilities. 2002. Virginia Marine Science Consortium and the Virginia Sea Grant College Program. Grant No. NA56RG0141, Publication VSG-02-10. 33 pp. (3). An article entitled: "HACCP Risk Management Tool Controls Viral Pathogens at Shrimp Facilities." *Global Aquaculture Advocate*. Oct. 2002. Pp. 72-74.

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

Biological and Economic Feasibility of Using Pure Oxygen Generation and Low-Head Oxygenator Diffusion Technology to Improve Water Quality and Increased Fish Production at Virginia Trout Raceway Facilities

The focus of this project is 1) to compare critical water quality variables and solids loading in trout raceway systems using aeration and oxygen injection, 2) to compare trout growth, survival, condition factor, feed conversion efficiency, blood hematocrit, and fish health in raceway systems with aeration and oxygen injection, and 3) to evaluate the economics of converting from aeration to oxygen injection fish production systems. This project was ranked as a critical economic issue by the Virginia Trout Growers Association, and funded for one-year of the requested two year study by CFAST, CALS Agricultural Experiment Station. Requested funding for completion of this study in 2002-2003 was denied and, therefore the results are pending. The project directly addresses the stated needs of the Virginia Trout Growers Association, a small, struggling industry that has historically been underserved and underrepresented. The biotic metrics measured will be: trout growth, survival, condition factor, and feed conversion efficiency, and water quality in raceway systems with aeration and oxygen injection. Impact of this study will be directly related to the overall fish production and economic assessment of current aeration vs oxygen injection technology. Impacts to Virginia trout producers will be measured by the proportion of those that incorporate this new technology, enhanced fish production, and cost savings, if it proves cost effective. Preliminary results indicate that oxygen injection technology will improve fish production, but a comprehensive economic evaluation has not yet been completed.

Forest Bank: Concept to Reality

Other states currently involved: IN

This project involved the integration of human dimension, economic, and spatial data research in support of the development of a forest banking project in southwest Virginia and southeast Indiana in cooperation with The Nature Conservancy. Also included were a series of educational programs for landowners and attendant publications. Forest banking allows for a landowner to permanently sell the timber rights to his/her property. The owner then receives an annuity equal to a fixed percent of the value of the timber rights deposited. The receiving organization in this case is The Nature Conservancy (TNC). The TNC agrees to sustainably manage and harvest the timber in accordance with state recommended best management practices and other accepted norms for sustainable forestry. In the affected areas, SW Virginia and SE Indiana, critical environmental issues are at stake, and they are threatened by detrimental land use practices such as logging, coal mining, abusive agriculture, and uncontrolled development. Protection of the land through innovative partnerships such as this will still allow the land to remain in private ownership, reward the participants with economic incentives, and allow for third party management so that biodiversity and endangered species are protected. Under-served and under-represented audiences are encouraged to participate in the program. The primary outcome is for the forest banking program to be operational and begin to accumulate participating landowners. Impact would be the protection of aquatic resources over the long term. As of the end of 2002 the forest banking program in SW Virginia is operational with a total of 6,425 acres now being sustainably managed.

Marketing and Sales of Forest Products

In cooperation with the Virginia Department of Forestry, research is being conducted on the utilization of small diameter hardwood timber by sawmills in the Commonwealth. The Commonwealth has an abundance of lower quality, smaller diameter, under-utilized timber. This problem has been recognized at the national level by the USDA Forest Service. Opportunities to use this material in the production of lumber and other products can provide sawmills with a lower cost resource. If proven cost effective, this research will assist in developing markets for this research and provide opportunities for the harvesting of smaller diameter wood for higher value markets. Many sawmills are located in rural areas where employment opportunities are limited. The utilization of small diameter timber may provide increased employment opportunities in these areas. Cost analysis is being conducted on the sawing of 6"-10" diameter timber in a sawmill in southwest Virginia. The results will be published in a comprehensive report which will be available in the spring of 2003.

Environmental Economics/Water Quality

Other states involved: MD, PA, DE, WV, NY, DC

The program deals with resource protection and enhancement in the 43,000 square mile Chesapeake Bay drainage basin including all or part of the five states and DC. The research and implementation program integrates protection and enhancement efforts in five major areas: living resource protection and restoration, vital habitat protection and restoration, water quality protection and restoration, sound land use, and stewardship and community engagement. Efforts deal with agricultural, rural areas, suburban areas and urban areas on an integrated basis. Resource conservation and conversion of resource lands (agricultural, forest and open lands) is a significant issue under the sound land use category. In June 2000, "Chesapeake 2000 - A Watershed Partnership" agreement was signed by the Governors of VA, MD and PA plus the Mayor of DC. This agreement provides a strong basis and direction for all federal, state and local resource related actions. Substantial citizen and stakeholder input influenced the development of the Chesapeake 2000 Agreement. Numerous citizen and stakeholder advisory committees will monitor and assist implementation of the agreement.

Powell River Project

Other states involved: WV, KY

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

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

The 4-H Communities Collaborating for Youth Project

The 4-H Communities Collaborating for Youth Project assisted local Extension Leadership Councils in developing Extension programs for children, youth, and families at-risk through a collaborative process. Virginia Cooperative Extension units participating in the project were Alexandria, Arlington, Brunswick, and Fairfax. The local Extension Leadership Councils in the participating counties worked collaboratively with Extension staff and other organizations and individuals to empower limited resource communities to solve local problems. A community building process is the main focus of this program. A diverse collaboration was specifically designed for each community and through a strategic program planning process community needs were identified and addressed.

I. Children and Youth Outcomes

Fairfax's Kingsley Family Resource Center: An average of 50 low-income women (mostly Hispanic) participate weekly in the activities at the Kingsley Family Resource Center. Classes and consultation on health related issues aid participants in developing childcare skills and in caring for their infants. Trained health care professionals and Extension's SCNEP and EFNEP Program Staff facilitate sessions. Participants report that they are gaining skills in childcare, family planning, and are building relationships with their neighbors that are aiding them with securing childcare and in dealing with personal issues.

Fairfax's Kingsley Afterschool Program: In 1998, Graham Roads School, located in the Kingsley Community, lost its accreditation because of low SOL scores. 95% of the school's population (mostly Hispanic) comes from this community. Three years later (2001) accreditation was restored. Principal credits the work with the parents at the Kingsley Family resource Center as being a major contributor toward this process. Through the center parents are being kept informed about activities and being oriented frequently about school operation and parents' responsibility.

Arlington Douglas Park Neighborhood Partnership: Kindergarten students and their immigrant parents who participated in Family Night School were selected by their teachers as needing extra support. The children worked with the school's reading specialist on pre-reading skills and with a kindergarten teacher on math activities. Parents became familiar with the school facility, key staff members, and routines. Parents also learned how to use everyday activities and games to help their children develop reading and math skills. Each evening concluded with parent-child activities to model what families can do at home. Objectives included recognizing, stating, and writing name, distinguishing and labeling sounds in the environment, using full sentences to respond, following one- and two-step directions, etc. Parents were able to name their child's teacher and locate the child's classroom, office, clinic, and gym. Parents completed weekly homework activities related to the lessons and demonstrated their understanding of attendance and health clinic procedures. The PTA president, who coordinated volunteer support for the program, noted that over the course of the series parents became more comfortable in the school setting, fathers began

participating, and parents became a support group for one another. Principal reported that a parent who appeared unlikely to be involved in the school recently participated with confidence in an Individual Education Plan meeting with staff. NPP was awarded \$25,000 from Freddie Mac to continue Pre-K Family Night Program.

Brunswick Meherrin Powellton School Community Partnership: Meherrin Powellton Elementary School was awarded \$1,000 to explore the possibility of implementing a Positive Behavior Support (PBS) system. 4-H Agent served on PBS team through the spring and worked closely with school staff to implement the program during the 2001-2002 school year. Discipline referrals were down 60% for the first month of this school year as a result of this program, which rewards students for positive behaviors. In December, a second evaluation also showed a marked improvement (decrease in discipline referrals) from the previous time frame last year. Students receive coupons, which are redeemed at a special store at school. Students are also rewarded every nine weeks with a party. Students attend a booster session, rather than the party, if they have not displayed positive behavior. 4-H Agent serves as advisor for the Student Representatives (2 students from each of the 4th, 5th, and 6th grade classes.) These student reps provide input and evaluation from fellow students and assist in the planning and supervision of activities during the 9 weeks party.

Alexandria's GW Power Up Afterschool Program: An average of two hundred sixty-five (265) youth participated in the GW Power Up Project at George Washington Middle School each year. A CYFAR site-coordinator, Alexandria Department of Parks, Recreation, and Cultural Activities employees, and volunteers staffed the site. Power Up was open Monday through Friday, 3-6 PM. Programs and activities offered during afterschool hours include homework help and enrichment activities. An estimated number of face to face contacts is 7,526. Thirty-nine (39) volunteers contributed a total of 1,300 hours. Based on feedback, principals reported a decrease in violence and few referrals from those involved in the program. Based on a parent survey, parents report that youth are able to deal with conflict better and are display a more positive attitude toward homework and school. Sixth grade science teachers report that the students are more prepared for class and settle down more quickly upon their arrival to class.

Alexandria's GW Power Up Program: A pre and post assessment reports the following about the young people who graduated from Alexandria GW Power Up 4-H Smart Choices Nutrition Education Program (SCNEP):

	Pre-Test	Post-Test
Percentage of Youth Who Eat a Variety of Foods (Eat many different types of foods so that their bodies receive essential nutrients; know that skipping meals is not a good idea)	63%	65%
Knowledge of Food Safety (Thawing and storing foods properly)	52%	70%
Select Nutritious Foods (Include 6-8 glasses water in their diet)	65%	87%
Practice Eating a Healthy Diet (Eat at least three meals a day)	57%	83%

Fairfax/Kingsley Homework Help Center: A questionnaire was sent out to 94 parents with children who attended the Homework Help Center. 58 questionnaires were returned for a 62% response rate. The questionnaire included 15 questions based on academic performance, behavior changes, and attitudes. Data analysis suggests that as a result of participation in the program...

- 74% parents felt their child studied more
- 72% parents felt their child read more
- 84% parents felt their child showed more positive attitude towards going to school
- 60% parents felt their child was participating more in school activities.
- 84% parents felt their child goes to the library more often.
- 72% parents felt their child has increased his/her self-esteem.
- 60% parents felt their child has become more responsible.
- 60% parents felt their child improved his/her grades.
- 67% parents felt their child improved his/her attendance.
- 84% parents felt their child improved his/her behavior.
- 93% parents felt their child was provided extra help with schoolwork.
- 57% parents felt their child was provided with enrichment activities that are fun.
- 74% parents felt their child was getting help with his/her English skills.
- 95% parents felt their homework center is an important resource in the community.
- 93% parents felt the homework center was a place that has made a positive impact on their child.

II. Parent Outcomes

Fairfax/Kingsley Homework Help Center: Based on a post survey of 53 parents who participated in Fairfax's "Learning is for Everyone":

- 94% reported feeling more comfortable with helping their children with school work and reading.
- 69% of the parents gained confidence and stronger academic skills to pursue better jobs.

III. Communities Outcomes

Virginia's State Strengthening Project: Within the four project communities, 60 agencies collaborated with the Extension Leadership Councils through the provision of facilities and space, program planning and monitoring, training, public support, participant identification and referral, and support services. The collaborative partners included those from public schools, human service agencies, businesses, municipal agencies, residential/neighborhood groups, hobby group, and local colleges and universities. Total number of youth reached was 10,451 and total number of adults reached was 473.

Fairfax/Kingsley Homework Help Center: the Fairfax Board of Supervisors recognized The Kingsley Project as an effective and exemplary model of collaboration. Chesapeake Management has contributed over \$500,000 of in kind dollars with renovating two basement

units for community programs and contributed \$30,000 to support staff for the program. Twenty-two (22) volunteers have contributed 8,406 volunteer hours. Knox Presbyterian Church and Graham Road Elementary School have dedicated a major part of their resources for outreach to families and tutorial support respectively.

Brunswick Meherrin Powellton School Community Partnership: Three of the awards made to exiting community youth organizations by the Brunswick ELC/Grant Steering Committee reported the following.

- The “It’s Fun to Read Accelerated Books” purchased 50 books. The books, placed in the library, were reviewed and catalogued by the students. Students have written book reviews and filed them for preview by other students.
- A Parent Resource Center was established at the Meherrin-Powellton Elementary School. The Parent Resource Center was staffed four hours per week by parents who are familiar with the system. The center included information for parents on a variety of topics, i.e., discipline, self esteem, helping your child with school, etc. According to the principal, approximately 50 parents have used the center.
- Educational materials, tents, sleeping bags, and flashlights were purchased for Boy Scout Pack #45. A majority of the members of this Boy Scout troop come from single parent families.

Child and Adolescent Nutrition and Fitness (Fit for Life)

The program aims to improve dietary and physical activity practices of youth through several different approaches:

- Assessment of the prevalence of childhood overweight among children in Virginia through a grant from the Southern Rural Development Center and through a partnership with the Dept. of Health
- Evaluation of dietary acculturation among limited income recent immigrants (and the impact on children’s weight and health)
- Establishment of a statewide task force on childhood obesity to develop a unified approach towards childhood obesity through collaborations with other state organizations
- Identification of educational strategies and topics for curricula and lesson plans to be used by Extension Agents and EFNEP and SCNEP Program Assistants
- Development and evaluation of a curriculum for parents and childcare providers, based on the W. Virginia Dining with Diabetes, to improve knowledge, skills, and attitudes towards eating and cooking healthfully and being active

Childhood obesity is a growing issue among youth across the United States and, likely, in Virginia. Unfortunately, the Youth Risk Behavioral Surveillance Survey (YRBS) is not conducted in Virginia, so there is little data on the prevalence of overweight among children and adolescents in Virginia. The YRBS is a valuable assessment tool to collect information from youth on several risk factors, including weight and height. Virginia is one of three states not conducting the survey. In order to obtain external funding, it is important to be able to document the problem. This is the first step. The second step is to determine how to effectively address the issue. This is currently being investigated through a needs assessment (focused discussions and

survey instruments) with Extension Agents and EFNEP and SCNEP Program Assistants located directly in communities. One of the studies, the Assessment of Dietary Acculturation, addresses specific issues of Mexican Americans living in northern Virginia. Every attempt will be made to incorporate culturally-appropriate foods in the development of the curriculum and educational materials. For the data collection component, the expected outcome is to obtain data on the prevalence of overweight among a cross-section of children in Virginia. For the programmatic areas, we are still conducting the needs assessment, so we are still outlining specific objectives, etc.

F. Civil Rights

Virginia Cooperative Extension (VCE) is an educational outreach program of Virginia's land grant universities, Virginia Tech and Virginia State. Its mission is to enable people to improve their lives through an educational process that uses scientific knowledge focused on issues and needs. VCE is committed to the enhancement of equal opportunity and diversity in employment, programs, and collaborative efforts with volunteers and stakeholders. To continue building upon these commitments, strategies have been implemented which have yielded positive results, and are outlined below.

Equal Opportunity Employment

VCE does not discriminate against employees or applicants on the basis of race, sex, disability, age, veteran status, national origin, religion, or political affiliation. VCE strives to employ personnel that is representative of state demographics and has implemented effective recruitment, training, and retention efforts to ensure the existence of a competent, diverse workforce dedicated to working with all people in the Commonwealth.

Severe budget reductions have prevented VCE from continuing with its recruitment efforts outlined below. In late January 2001, VCE began implementing strategies for absorbing base budget reductions which ultimately totaled more than 6 million dollars or approximately 20% of state funding. Through January 2003, more than 125 faculty and staff have been lost through early retirements and resignations. Recovery from the budget reductions are likely to prevent recruitment and hiring for the next 18-24 months.

VCE has implemented an evolving plan which identifies qualified individuals, especially minorities, to fill vacancies as they occur. With the successful recruitment and hiring of non-traditional Extension agents continuing to be a challenge, especially as it relates to African-American males, VCE has integrated specific components aimed at workforce diversification into an overall recruitment plan.

To the extent that educational assistance is an attractive recruiting tool, VCE has successfully used various methods of educational assistance designed to aid in the recruitment of agents, as outlined in the VCE Education and Professional Development Opportunities Program. This program has provided additional flexibility for recruiting underrepresented agents and for assisting employees in the pursuit of advanced degrees. Assistance includes, but is not limited to scholarship, tuition assistance, graduate assistantships, and paid internships.

All agent position announcements are electronically distributed to members of the VCE Leadership Council (ELC) which is comprised of diverse elected and at-large representatives from the 22 Planning Districts in Virginia. The ELC mission is to advance and promote the educational programs of VCE and members assume an active role in recruiting process.

Agent faculty and state and district administrators have the responsibility of identifying potential non-traditional agents through networking at meetings, career programs, conferences, individual communications with peers, other Extension employees, and clientele.

Program Delivery

VCE operates as a joint program of Virginia State and Virginia Tech. While each university has its particular program strengths, delivery at the local level constitutes a unified approach. The strength of Extension agents and specialists delivering programs to the people is the network of local Extension Leadership Councils which assist in the identification of local needs as well as the development and delivery of educational programs. ELCs are required to have members who represent the diversity in the communities served. VCE does not provide programs to or collaborate with other organizations that do not have nondiscrimination policies. "All reasonable efforts" are made and documented by Extension personnel to ensure that underrepresented clientele are involved in programs. VCE continues to rely upon specific strategies to include these audiences in its programs. Face to face contacts, marketing programs in minority media, strategic location of meetings and classes, and promoting programs through minority places of worship continue to be successful means of recruiting difficult-to-reach participants.

Agent faculty who deliver programs prepare and submit an annual Personal Action Plan (PAP) which is approved by the district supervisor at the beginning of the performance cycle. The plan must include a specific component for identifying at least one underserved audience with strategies for reaching a targeted group. During the evaluation meeting at the end of the performance cycle, the supervisor reviews the agent's progress in reaching the underserved audience(s) which was identified in the PAP. The supervisor evaluates the efforts and outcomes and considers these components when determining salary increases.

Public Notification

VCE requires specific methods for notifying clientele of its equal opportunity and non-discrimination policies. Among the numerous methods of public notification are the following:

- Equal opportunity/non-discrimination statements are displayed in all publications, letterhead, applications, and other printed materials.
- Extension volunteers are informed of the requirement of compliance with all principles of civil rights.
- Required signage, including the posters "...And Justice for All," and Know Your Rights, are prominently displayed in conspicuous locations in unit offices.
- Pictures in catalogs, Extension produced videos and publications, research bulletins and other publications reflect diversity in programming and employment.
- A standardized ADA statement to ensure accommodation for the disabled is prominent in all materials promoting programs or services.
- Unit extension offices use mailing lists of local churches and civic groups with minority membership to promote programs and employment.
- Position descriptions for all extension agent positions include responsibility for programming in accordance with EEO/AA/CR and diversity guidelines.

Civil Rights Training and On-site Civil Rights Reviews

Extension agents and specialists participate in various civil rights, diversity, and program outreach sessions as a part of new employee orientation, in-service training, and the annual conference.

Supervisors who conduct extension agent performance evaluations are trained to evaluate the specific requirement which reads: "Evidence of a commitment to working with diverse clientele and colleagues and a willingness to further the civil rights program of Virginia Cooperative Extension." Department heads and district directors continually review compliance progress with faculty conducting research and extension programs.

To continue building upon existing training efforts, VCE utilizes a non-traditional comprehensive internal civil rights review process designed to educate and train paid and unpaid staff in areas related to program outreach, equal opportunity, civil rights, and diversity. The process also includes an evaluation of records to ensure compliance with related policies and procedures.

The process is a peer concept, which allows Extension agents to observe how coworkers determine and implement planned outreach efforts to diversify the client based for achieving programming excellence. The basic review team is comprised of a state staff member, a district director, and three Extension agents, one from each of the three program areas. The Extension agent representatives on the review team are changed for each review allowing a greater number to participate in the experience. These agents then communicate the information and benefits of the experience with coworkers in his or her respective office. This is an effective method for exposing a greater number of units to the process.

Civil Rights Compliance Unit Review and other EO/AA and diversity information are located on a system-wide Intranet site which can be accessed and used as a reference by the entire VCE system.

Reductions in faculty and staff and redistribution of human resources due to budget cuts have prevented VCE from conducting planned reviews. In a normal year, VCE strives to conduct 14 reviews annually, including two local units per district, and an Agricultural Research and Extension Center (AREC) or 4-H center. The reviews consist of record examination and group and individual interactions and interviews with all faculty and staff. Volunteers involved in the unit programming process are invited and often participate in the review. The Extension hiring and programming processes are reviewed to determine the extent of employee knowledge and commitment to equal opportunity and diversity in employment. Upon conclusion of each unit review, findings and recommendations are shared with staff in an exit review with a follow-up in writing. The district director follows up with the unit to implement efforts for correcting deficiencies.