Virginia Tech and Virginia State University
Agricultural Research and Extension
FY 2000 Annual Report of Accomplishments and Results

The following is the Virginia Annual Report of Accomplishments and Results for October 1, 1999 through September 30, 2000. The report includes the Agricultural Research and Extension programs at Virginia Tech and Virginia State University.

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A. National Goals

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

Overview

Over the reporting period, agriculture in Virginia witnessed numerous changes and challenges (e.g. drought, pests, prices, and labor) in nearly every agriculture-related sector. Many of these events have challenged farmers as they seek to make a profit, support their families, stay in business, and maintain a high quality of life. The research and extension programs from Virginia Tech and Virginia State University have helped farmers and other citizens adapt to the constant new challenges that each year brings. Development of new knowledge in agricultural production systems - and the extension of that knowledge - builds a better-informed citizenry.

Virginia Tech and Virginia State University employed numerous strategies over the reporting period to maintain diverse research and extension programs addressing Goal 1 issues. Some of these strategies were:

Research

- Conducted market research to determine domestic and global demand for agriculture and forest-based commodities.
- Designed and implemented research on market-based solutions for achieving sustainable environmental and natural resource systems.
- Developed processes and designed production systems to ensure safety and quality.
- Developed efficient systems for small ruminant meat production to decrease the dependency upon imports of these products, while emphasizing sustainable systems, suitable for small-scale production.
- Used waste products to reduce livestock production costs.
- Developed liquid fuels and polymers from wood and agricultural waste to replace some materials presently produced from non-renewable resources.
- Established "precision farming" methods.
- Refined computer-aided grading and defect-recognition systems for secondary manufacturing of wood products.
- Used rapid, biotechnology-based methods to detect plant pathogen.
- Developed transgenic plants and animals as bioreactors for creating the human therapeutic products.

- Identified alternative uses for agriculture commodities and low-value timber resources and developed processes for developing new products.
- Evaluated the production of alternative and non-traditional crops.
- Enhanced the multiple benefits of agriculture and forest management.
- Established small ruminant meat production systems to impact small and part time farmers.
- Studied new and traditional crops.
- Developed sustainable technology for producing food and industrial use.
- Used molecular cell biology and biotechnology to improve the performance and efficiency of food and fiber production.
- Developed technologies for recycling wood- and agriculture-based materials, including farm waste, solid wood, and paper products.
- Developed management systems for transgenic crops that reduce pesticide use and control pests.
- Developed World Wide Web and computer-assisted decision aids that enhance all areas of agriculture and forestry.
- Created and refined diagnostic, therapeutic, and preventive technologies, including biotechnological techniques that improve farm animal health, well being, and disease prevention.
- Identified through biotechnology and traditional plant breeding methods disease resistant varieties of economically important agronomic crops.
- Generated technology and expertise to ensure production of economical and wholesome food and efficient use of natural resources.
- Integrated plant breeding with evaluation of biochemical components, pest resistance, and agronomic characteristic.

Extension

- Developed and provided educational programs to assist farm family members working together.
- Provided educational programs that enhanced Virginians' understanding of and appreciation for the issues related to agricultural and forestry production.
- Generated and disseminated knowledge in production economics, farm and agribusiness management, financial management, marketing and price processes, aquaculture, and policy analyses that will improve competitiveness.

- Provided educational programs that assist farm families in financial risk management.
- Provided educational programs on consumer economics.
- Provided educational programs that assist individuals and families in making the transition from welfare to work.
- Developed natural resource conservation plans integrated with sustainable development principles.
- Worked with landowners to select management practices that allow economic development while simultaneously conserving wildlife and other natural resources.
- Provided students and agricultural entrepreneurs with the tools that allow them to successfully respond to economic and technical changes.
- Provided educational and technical assistance to small, limited resource and socially disadvantage clientele.
- Educational strategies included field days, conferences, on-farm demonstrations, producer meetings, one-on-one visitations, and distribution of publications and fact sheets.
- Materials and technologies included personal computers, Internet, Electronic mail, satellite uplinks and downlinks, and two-way video conferencing; publications, fact sheets, slide programs, videotapes, etc.
- Delivered educational programs using the most up-to-date information technologies.
- Developed specific web sites.
- Developed new techniques and strategies for investigating and reporting problems with animal and human public health and food safety.
- Provided cutting-edge educational programming to the farm, forest, turf, and landscape industries.
- Continued to provide soil survey characterization.
- Developed and utilize geographic information systems for natural resource management in the state.
- Developed the research-based information needed by private and public leaders when developing governmental policies, programs, and regulations to assure that policy goals and objectives are realized.
- Developed and delivered research-based educational programs on Alternative and Sustainable Agriculture.

Internal and external linkages

Research projects are interdisciplinary including departments at Virginia Tech and Virginia State University, including the off-campus Agricultural Research and Extension Centers of Virginia Tech. External cooperation

is based on the nearly 80 agencies and commodity organizations that endorsed the Virginia Tech strategic plan, the "Plan to Serve Virginia Agriculture, Human, and Natural Resources and the Virginia State University Division of Agriculture Strategic Plan." Participation and cooperation by state and federal agencies and other universities has been important in achieving the research and extension objectives in Goal I. Further, activities require multi-disciplinary teams of experts in plant breeding, agronomy, biochemistry, and entomology, along with a link to producers through extension personnel. The USDA germplasm collections and ARS facilities provide materials and human support. Private industry participation has been important to us with collaborations are that are material, informational, and financial.

In conducting their research and extension programs, Virginia Tech and Virginia State have relied on mutually beneficial collaborations and linkages with other appropriate land grant institutions, the Virginia Department of Agriculture and Consumer Service (VDACS), the Virginia Department of Environmental Quality (DEQ), and other state and local agencies and groups. These agencies have relied on the land-grant federal/state partnership with the United States Department of Agriculture (USDA) administered through its Cooperative State Research Education and Extension Service (CSREES). Additionally the two institutions have cooperated with other USDA agencies such as the Agriculture Research Service (ARS), the Natural Resources Conservation Service (NRCS), and Economic Research Service (ERS).

OBJECTIVE 1: To produce new and value-added agricultural products and commodities.

Performance goal 1: To annually increase the research and knowledge base available from CSREES partners and cooperators on new and value-added commodities and products in U.S. agriculture.
Indicators: Number and type of significant research projects on new and value-added commodities and products in U.S. agriculture.
Evaluation framework: CRIS reports will be examined to document significant research projects on new and value-added commodities and products in U.S. agriculture.

2000 Indicator results:

The VAES project, "Quality Assessment and Processing of Value-Added Fluid Dairy Emulsions," is demonstrating avenues in which modified milk fat can be reincorporated into value-added dairy foods. Dairy processors are able to process dairy with improved nutritional benefits, and they can make a greater profit from value-added dairy products. Small herd dairy farmers can create value in their herd mild and sell the specialty milk for greater profit.

The VAES project, "Development of Low-Saturated, Low-Linolenic Soybean Cultivars" was begun because soybean oil is abundant, but has inferior characteristics that limit its use in edible applications. Development of non-GMO soybean varieties having oil containing lower saturated fat and improved oxidative stability is needed to correct the problems and thereby add value to the product. Soybean oil typically contains 11% 16:0 and 8% 18:3. Natural gene mutations have been found that affect less than 4% 16:0 and less than 4% 18:3 in crude oil. This germplasm is freely available to the public and private sector, and is being used to develop public soybean varieties with improved oil quality. Genes that govern low- 16:0 and low-18:3 concentration are added to elite public soybean cultivars in Maturity Group 0 to VIII. This effort establishes a broad production base needed to support major markets for low-saturated fat soybeans that also reduce need for hydrogenation, in accord with industry mandates to help maintain a strong competitive market advantage.

The VAES project, "Value-Added Concepts for Development of Dairy Products" reveals that osteoporosis is a leading cause of morbidity and mortality in women, but many women do not consume enough dairy products daily. Studies included development of foodservice applications for a thermally processed fluid milk and egg mix that is low in lactose, fat, and cholesterol. The mix was used to formulate a variety of desserts and entrees. Products were formulated with at least 45% of the mix. Consumer testing of a ham and cheddar quiche and a raspberry swirl cream pie made with the mix revealed that these products were acceptable. Nutrition education programs and dairy products are being designed that will improve women's consumption of dairy products, thereby helping to decrease their risk for osteoporosis.

The VAES Project, "Economic Analysis of Virginia's Hardwood Resource," has produced three major results. One of these consisted of estimates of regional economic impact multipliers for selected wood-using industries in southwestern Virginia. Income multipliers ranged from 2:1 to 14:1 wood products industries. Employment multipliers ranged from 2:1 to 4:1. Value-added multipliers for the forest products, forestry products, and wood containers industries rank in the top 10 percentile when compared with all other industries in the region. Value-added multipliers for the wood preserving, sawmills and planning mills, and veneer and plywood industries rank in the upper 25 percentile. The very large multipliers for wood industry investments indicate that they have excellent potential for generating regional income and employment. The overall results should greatly aid economic development in southwestern Virginia.

Performance goal 2: To annually increase agricultural producer awareness, understanding, and information regarding the production of new and value-added commodities and products in U.S. agriculture in which CSREES partners and cooperators play and active research, education, or extension role.
Indicators: The total number of persons completing non-formal education programs on production of new and value-added commodities and products.
Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System.

2000 Indicator results:
Number of persons participating in Extended Learning Programs in which value-added products were addressed:

Ext. Learning Prog.	**Number**
Alt. Ag.	1372
Aquaculture	569
Fruit Ind. Sus.	2979
Grain Soybean	33008
Vegetables	2318
Peanut Produc.	849
Food Process.	9682
Wood Prod.	1329
Total No. Learners	***52106***

OBJECTIVE 2: To increase the global competitiveness of the U.S. agricultural production system.

Performance goal 1: To annually increase the research and knowledge base available from CSREES partners and cooperators on improving the productivity and global competitiveness of the U.S. agricultural production system.
Indicators: Number and type of significant research underway or proposed that will result in improvements in the productivity and global competitiveness of the U.S. agricultural production system.
Evaluation framework: CRIS reports will be examined to document significant research underway or proposed that will result in improvements in the productivity and global competitiveness of the U.S. agricultural production system.

2000 Indicator results:
The VAES project, "An Evaluation of International Markets for Southern Commodities," focuses on identifying the importance of international trade to commodities produced in Virginia to make them globally competitive. Results demonstrate that Virginia is dependent on international trade to an extent similar to the rest of the United States, but that this dependence comes from different commodities. In Virginia, tobacco exports are particularly important. Virginia agriculture is also dependent on exports because
international shipments of poultry products have risen markedly in the past five years. The dependence of Virginia agriculture on international trade will guide decision makers toward appropriate policies and market opportunities. A second thrust of this research is on sanitary and phytosanitary and other technical barriers to agricultural trade. This research provides an assessment of the incidence and importance of technical barriers based on a 1996 comprehensive USDA survey of foreign markets, which shows nearly $5 billion of exports blocked by barriers of questionable scientific merit. A second study showed that U.S. decisions have counteracting effect on foreign countries. This understanding will contribute to efforts of the United States to negotiate a lowering of these barriers when they are unnecessary to protect domestic agriculture from pest
infestations. These negotiations will take place on a bilateral basis and through international organizations.

The Virginia State University Agriculture Research Service (VSU/ARS) project, Evaluation of Goat Breeds for Meat Production in Virginia, established parameters for the use of accelerated mating that will allow production of more than one kid crop per year, thus utilizing available farm resources more effectively. The findings of internal parasite resistance to commercial anthelmintics impresses upon farmers the need for comprehensive parasite control systems that include the judicious and strategic use of these products.

The VSU/ARS project, Small Ruminant Meat Production for Virginia: Effects of Species, Breed and Mating System, 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 VSU/ARS project, Evaluation of Biorational Pesticides and Development of Strategies to Enhance Biocontrol of Insects, overall goal is to established that botanical pesticides and more effective use of natural enemies will allow limited resource vegetable greenhouses to reduce or eliminate pesticide use, control pesticide resistant whiteflies, and obtain higher premiums for organic produce, and the use of pheromone traps to monitor insect pest populations may reduce the amount of pesticide needed to produce fresh market quality sweet corn in Virginia.

The VSU/ARS project, Development of A Sustainable Systems For Production of Specialty Crops, is to assist farmers to diversify their farming operation using inorganic fertilizers thus reducing input costs and farm profits and pollution of water resources.

The VSU/ARS project, Inheritance Study of Vegetable Soybean for Isoflavone Content and Pod Shattering Resistance, was develop as follow-up project for developing varieties of vegetable soybean suitable to Virginia and the mid-Atlantic region to assist farmers in these areas to diversify their farm operations to increase profit. Vegetable type soybean contains isoflavones that may greatly benefit human health, but pod shatter at maturity. The identification and development of vegetable soybean lines high in isoflavones and devoid of pod shattering at maturity will assist these farmers to capture the U.S. and export markets for vegetable soybean which is high in demand.

The VSU/ARS project, Therapeutic Potential of Soybean and Soybean Phytochemicals on Controlling Type II Diabetes Mell, began because there is convincing evidence that soy foods have beneficial effects on cardiovascular diseases (CVD) including atherosclerosis. This research attempts to answer if there are any benefits for the use of the purified soy protein or purified isoflavones pills (e.g. effects on CVD, hyperplasis, or ischemic heart). Preliminary data indicate that consuming whole soy or soy flour is more effective in reducing LDL, triglycerides, hyperplasia and increased HDL and elasticity of the arterial wall in animal models.

These projects produced seven referred journal publications in FY2000.

Performance goal 2: To increase agricultural producer awareness, understanding, and information on improving the productivity and global competitiveness of the U.S. agricultural production system in which CSREES partners and cooperators play active research and extension roles.
Indicators: The total number of persons completing non-formal education programs to improve the productivity and global competitiveness of the U.S. agricultural production system.
Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System.

2000 Indicator results:
Number of persons participating in Extended Learning Programs in which productivity and competitiveness issues were addressed:

Ext. Learning Prog.	**Number**
Agric. Business	7182
Alt. Ag.	1372
Sus. Dairy Prod.	792
Nursery Prod.	4210
Turf Prod.	4054
Cotton Prod.	2499
Forestry, Nat. Res.	23,805
Fruit Ind. Sus.	2979
Grain Soybean	33008
Vegetables	2318
IPM	132583
Pasture Mgnt.	9559
Peanut Prod.	849
Livestock Poultry	37609
Food Process.	9682
Landscape Mgnt.	20017
Wood Prod.	1329
Econ. Self-Suffic.	36134
Total No. Learners	***329981***

OBJECTIVE 3: To improve decision-making on public policies related to the productivity and global competitiveness of the U.S. agricultural production system.

Performance goal 1: To annually increase the research and knowledge-base available from CSREES partners and cooperators on public policy issues affecting the productivity and global competitiveness of the U.S. agricultural production system.
Indicators: Number and type of significant research underway or proposed on public policy issues affecting the productivity and global competitiveness of the U.S. agricultural production system.
Evaluation framework: CRIS reports will be examined to document significant research underway or proposed on public policy issues affecting the productivity and global competitiveness of the U.S. agricultural production system.

2000 Indicator results:
The joint VAES/VCE project, "Annual Survey of Quality of Life in the Commonwealth of Virginia," is a random sampling design employed to survey a cross-section of adults representative of household residents throughout Virginia. Questions focus on issues involving the economy, education, the environment, crime, work, family life, and a variety of other topics, including special items on welfare reform, health and opinions regarding managed care health plans, and home computer use. A written report is released in with results reported by gender, age, educational background and residence (urban crescent vs. remainder of the state). Results are available at a Virginia Tech web site (http://filebox.vt.edu/centers/survey/qol/index.html). 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, and Attorney General's office. Planning District Commissions throughout the Commonwealth also subscribe to these reports. Faculty members use the results in research projects and in strengthening proposals for research funding to study various topics. The quality of life in Virginia 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.

The VAES project, "Political Economy of Agricultural Trade and Domestic Policies," assess the implications for

domestic farm legislation of the agricultural public policy reforms achieved under NAFTA and the Uruguay Round GATT agreement. The international policy agreements may stimulate changes in domestic policy either directly or through political channels. The results support recommendations for institutional arrangements and private sector and public-sector activities to enhance the sustainability of agricultural policies and consequent competitiveness in world markets. Recent theoretical models are being extended to evaluate market and political equilibrium under international cooperation versus non-cooperation. The strategies, resource commitments, and coalitions among various groups interested in agricultural policy are being assessed, together with the effects of fiscal restraints and other factors. Based on characterization of the process of policy determination, an empirical version of the theoretical model is being formulated and used to simulate the effects of the recent international agreements on domestic farm-sector policy and economic equilibrium. The results of this project will guide public interest group approaches to and congressional decision-making about future farm policy. The results will be presented directly to the FAIR-Act mandated Commission on 21st Century Production Agriculture, which will report its recommendations to Congress before the 2002 farm bill debate.

Performance goal 2: To annually increase the effectiveness of constituent and citizen participation on public policy issues affecting the productivity and global competitiveness of the U.S. agricultural production system.
Indicators: The total number of persons annually completing non-formal education programs on topics related to public policy issues affecting the productivity and global competitiveness of the U.S. agricultural production system.
Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System.

2000 Indicator results:
Number of persons participating in Extended Learning Programs in which public policy issues were addressed:

Ext. Learning Prog.	**Number**
Administration	5045
Agri-bus. Mgnt.	7182

Ag. Damage Assess.	3183
Eng. Tech.	1223
Environ. Solid Waste	19887
Community Vitality	2495
Water Qual. Protect.	24898
Total No. Learners	***63913***

Key Themes

Adding Value to New and Old Agricultural Products

VAES research on soybean varieties for food uses. There is a large potential market for soybeans in food products in Asia, especially Japan. Varieties with the desired characteristics were being grown in the U.S., but none of them were adapted to growing in Virginia. Virginia Tech started soybean-breeding research in 1990 with the objective of developing small-seeded and large-seeded varieties that have the quality characteristics that make them desirable for various soy foods. To date we have released four small-seeded varieties and one large-seeded variety. In 1999, approximately 10,500 acres of our varieties are being grown in Virginia for export. The exported product will be worth about $5.4 million, for a net added value of $3.6 million over what could be obtained on the domestic market.

The U.S. soft red winter wheat industry has an expanding focus on functional traits such as protein quality, mixing time, and starch profile. This newer focus requires wheat producers examine their product and processes in a way that leverages their marketing opportunities. No single wheat cultivar can satisfy the requirements for every retail product. VAES researchers are developing a decision support system that will provide the capability of assessing risk levels associated with these functional traits, management requirements, supply flow, and location consistency of variety response

Animal Production Efficiency

In 1997, Virginia Cooperative Extension initiated a program with the Buckingham County Cattlemen's Association to cooperatively produce feeder cattle of similar breeding by contracting with an artificial breeding company to inseminate cows on multiple cooperator farms with semen from the same bull. Feeder cattle (1086 head) from the 1999 calving season were marketed in 2000 with an average price advantage of $7.63 and $4.19 per hundredweight for five and six weight steers, respectively, compared to other State graded feeder cattle sales the same week.

Avoiding Inbreeding of Dairy Cattle: Selection to improve productivity of dairy cattle cows has increased the probability of unintentional inbreeding. Inbreeding causes the opposite effect producers try to achieve, causing reductions in lifetime productivity and increases in the incidence of genetic abnormalities. VAES researchers documented the economic consequences of inbreeding for the nation's 10 million dairy cows with

particular emphasis on the cows that are not registered through breed associations. This information, along with recommendations on how to manage herds to avoid inbreeding, has been disseminated to producers through extension efforts. Two breeding associations and one private company, using information developed in this research, are working on software to help farmers choose mates for their cows with inbreeding considered.

Virginia Cooperative Extension worked with twenty Rockingham County dairy farms to demonstrate and evaluate two systematic artificial insemination programs. An Extension Agent provided monthly schedules and calendars for all milking herd inseminations on each of the farms from May through October, and collected cow pregnancy results. As a result of this educational program, participating dairy producers were able to reduce the average days open in their herds by 4.7 days per cow, generating a savings of over $1000 per herd.

Virginia Cooperative Extension conducted the first Virginia Cattlemen's college, which was held in conjunction with the Virginia Cattlemen's Association annual convention. Two hundred producers attended the school. Eighty-five percent of the respondents to a post-course survey indicated that they would apply a portion of the information learned to their operation.

Swine Pleuropneumonia Vaccine. Swine pleuropneumonia is a serious bacterial respiratory disease affecting pigs. Its high morbidity and mortality causes millions of dollars in production losses in the industry. VAES Researchers with the Virginia-Maryland Regional College of Veterinary Medicine have created a genetically altered live vaccine for swine pleuropneumonia that confers excellent immunity in pigs with minimal side effects. The vaccine has recently received final approval from the U.S. Department of Agriculture, and is now being marketed commercially as an agent to prevent pneumonia in pigs. In doing so, it has become the first avirulent live vaccine ever approved for preventing bacterial respiratory disease in animals.

Plant Production Efficiency

Biological Control of Alfalfa Weevil: A major concern for alfalfa growers is the damage caused by the alfalfa weevil. VAES research to measure the infestations and damage has shown that there is much less need for insecticides in the cooler ridge and valley portions of the state. Since the alfalfa weevil can be contained, knowing the status of the alfalfa weevil and the status of the biological control agents in Virginia fields could permit growers to reduce the need for insecticides. Improvement in the understanding of the biological control agents in the warmer Piedmont region also could reduce the need for insecticides there.

Virginia Cooperative Extension peanut leaf spot advisories saved growers approximately $39 per acre or $3 million across 75,000 acres of peanuts grown in southeast Virginia. Sclerotinia blight advisories improved the efficiency of fungicide sprays. Frost advisories enabled growers to avoid frost damage to peanuts, which can reduce crop

value by more than 50% at the farm gate. Soil temperature reports made the planting of crops more timely, and heat unit reports for peanuts made harvesting more timely.

> An estimated 300 State and regional grape producers obtained valuable information and recommendations on grape varieties suited to this region through a new Virginia Cooperative Extension publication on grape variety production.

Since 1997, 120 apple producers have learned how to manage intensive orchards through Virginia Cooperative Extension newsletters, educational meetings, and pruning demonstrations. As a result of these programs, approximately 80 percent of new apple tree plantings have occurred in intensive orchards during the past two years.

Fifty-one individuals attended a core grape production seminar and learned fundamental practices and principles involved in vineyard site selection, economics, and basic vineyard management. As a result of the knowledge learned, many of the participants decided that grape production would not be a suitable endeavor for their economic conditions or production site. Other participants established vineyards, raising the State's grape acreage to 1,964 acres, which was a 22 percent increase over 1998 figures. Virginia grape producers submitted 56 plant tissue samples for analysis, with the resulting information used to modify their vineyard fertilization programs.

Forty-five peanut producers participated in three peanut maturity clinics conducted in Dinwiddie County. Over 130 samples were pod blasted to determine the optimum harvest date. This was more critical in 1999 because of the wet conditions generated by two hurricanes. Samples represented over 3,000 acres of peanuts. Four participants stated that because of the information received through the clinics, they were able to save an additional 25 percent of their peanut crop with an estimated value of $100,000.

Diversified/Alternative Agriculture

A two-hour workshop and two days of farm tours and research plot demonstration results were conducted in Dinwiddie County for five meadowfoam producers. Producers used the knowledge gained from these experiences to improve meadowfoam production by 80 pounds over 1997 levels. Virginia State University also conducted programs for meadowfoam producers.

Research trials on pumpkin production conducted at the Southwest Virginia Agricultural Research and Extension Center were used by Extension Agents to formulate recommendations on variety selection, fertility, spacing, and production practices for approximately 100 growers. Virginia State University specialists also conducted butterbean demonstrations in southside Virginia, as well as meat goat demonstrations.

With technical assistance provided by Virginia Cooperative Extension, a central Virginia farm family successfully marketed 14 acres of strawberry production directly to Richmond area supermarkets. Their efforts to market a farm-branded product that was

grown in Virginia resulted in prices that were 25% higher than strawberries purchased from California.

Extension faculty developed and implemented nine statewide plastic mulched strawberry on-farm Extension demonstration plots, which tested, side-by-side, a new Virginia Tech variety and production system for colder environments compared to the less adapted current industry standard. Cooperating growers realized an additional $1200 in revenue as a result of the trials.

Virginia State University conducted a program for woodland owners to increase their income with American Ginseng. Applied research focused on evaluating economic costs and returns, determining growth requirements and site selection, controlling pests, and preventing human theft. Ginseng production research and demonstration plots were established on 20 farms in 14 Virginia counties to test crop responses to various soils and forest environments. Educational field programs have been conducted at six of these sites. An Extension publication was developed and is being distributed through Extension offices throughout the state.

Aquaculture

Creating Better Strains of Fish for Aquaculture. Enterprises producing fish in recirculating systems are a rapidly growing sector of commercial aquaculture. VAES researchers are working closely with two leading aquaculture enterprises to develop fish stocks suited to production in recirculating aquaculture systems. They have designed and helped implement a breeding plan that uses selective breeding for white body coloration and rapid growth rate for a Martinsville, Va., company. They also helped develop better brood stock for a company growing striped and white bass. Now about to enter its fourth generation, the breeding program at the Martinsville facility has resulted in a fast-growing, silvery-white stock of tilapia. Selective breeding of striped and white bass at AquaFuture attracted federal grant support, allowing cost-effective development of superior brood stock.

In another VAES project, fish species capable of being cultured in recirculating systems are being identified. Species selected must be economically produced for development of a commercial aquaculture industry. Production data and culture management protocols (e.g., growth rates, feed conversion, mortality, waste streams) for fish produced in recirculating systems are being verified. Budget analyses of production costs (e.g., fingerlings, feed, electricity, and water consumption) are being developed. The group is identifying and investigating market strategies and alternative channels for marketing the fish produced. Virginia State University continues to promote educational programming for pond and cage culture aquaculture.

Biotechnology

Biotech-In-A-Box. Biotechnology is a rapidly expanding area of science with an enormous potential to benefit people and for economic development in Virginia. Virginia Tech's Fralin Biotechnology Center provides workshops to give high school teachers the

skills and knowledge to teach students about the potential and limits of biotechnology. The center also circulates equipment kits to high schools, providing as much as $6,000 worth of equipment and supplies. Since 1994, 23,152 students statewide have been exposed to the scientific principles illustrated through the use of the equipment kits.

DNA vaccine against parasites. The cattle industry worldwide suffers millions of dollars in losses annually due to neosporosis, a condition caused by the protozoan parasite Neospora caninum (N. caninum) that results in abortions among cattle. VAES Researchers are focusing on immune response to vaccination, and observations may subsequently lead to the selection of immune-enhancers to provide protection against neosporosis. This project has a long-term goal to construct an effective recombinant DNA vaccine to produce an immune response against the parasite N. caninum.

Genetic Modification to Prevent Water Pollution. The continued growth in the number of large confined-animal operations has sparked public concern about their impact on the environment. Particular concern is being expressed about the potential release of phosphorus from the manure produced in swine operations and in poultry operations. The increased flow of nutrients, including phosphorus, into waterways has been associated with water quality degradation. VAES researchers are working to genetically engineer soybeans, a major source of feed for swine and poultry, as well as other animals, to allow the animals to use more of the plant's naturally occurring phosphorus. The result will be a decrease in phosphorus excreted by the animals.

Making a Better Oak Tree. The commercial use of oaks is widespread, from railroad ties and barrels, to more traditional items such as veneer, furniture, interior paneling, flooring, cabinets, pallets and pulpwood. During kiln drying as well as during the pulping of oak wood, a series of chemical reactions occur that can decrease the value of the timber produced, as well as increase the cost of pulping. These undesirable reactions are mainly due to a class of compounds called tannins. VAES Researchers in the department of wood science and forest products are studying the process of tannin formation in oak, with a long-term goal of controlling the process. This could result in increased value of the oak harvested and a decrease in the cost of processing it.

Genetic Disease Resistance. Diseases cause crop losses estimated at billions of dollars worldwide each year. VAES researchers have identified genes that confer resistance to gray leaf spot disease, a major corn production problem. They also have developed a novel laboratory procedure for rapid identification of disease resistance genes in soybean. This research has resulted in the development of gray leaf spot resistant corn hybrids. The laboratory procedure for soybean diseases should facilitate the identification and isolation of disease resistance in other crops as well.

Production of Blood Clotting Agents through Biotechnology. Transgenic animals are efficient, cost-effective, and safe systems for obtaining complex therapeutic proteins that may be utilized for treatment of numerous life-threatening diseases

in humans. The mammary gland has outstanding biosynthetic capabilities, and, for numerous reasons, pigs bioengineered to express these products in their milk at lactation are the best production models. Virginia Tech researchers have produced pigs that express several proteins of critical importance in the blood clotting and anti-clotting cascade, including human Protein C, Factor VIII, Factor IX, and fibrinogen, in their milk at lactation. This work has the long-range potential of producing human therapeutic proteins that are safe, efficacious, and available in ample quantity to fill a current void in supply. Availability of ample, cost-effective quantities of these products will potentially save human lives.

Gene mapping in both human and livestock populations represents a major, national research effort. Primary objectives are to develop treatment strategies for inherited diseases in the former population, and to increase productive in the latter. VAES researchers have developed statistical algorithms and computer software to locate the sites of genes with maximum probability of success. Laboratory test results and familial relationships among individuals supply the data used in the computations. The methods and software have greatly assisted targeted searches for gene location and proper gene association within linkage groups. Results are generally applicable to research to alleviate suffering from inherited diseases and enhance livestock productivity.

GIS/GPS

Area-wide pest management in turf landscapes. New ways are needed to determine the distribution of invasive pests and to develop strategies to manage them. VAES researchers have developed a system to integrate remote sensing, mathematical modeling, and Internet technologies to develop a tool for predicting the risk to turf grass areas, such as golf courses, from insects, weeds, and diseases. This pest forecasting system, when it becomes available, will enable turf managers throughout Virginia to view turf pest problems on a multi-county scale, which will allow them to anticipate when pests will develop in their area.

Soil survey data and GIS are important tools in land use planning. Intertwined, they represent an invaluable and underutilized resource. A high intensity soil survey was created for the Southern Piedmont Agricultural Research and Extension Center in Blackstone, VA. The soils information was recompiled from an uncorrected aerial photographic base to a USGS topographic base map. Soils data were added to numerous other data layers and images. Interpretation maps, flooding frequency maps, and runoff maps were created from map unit interpretive records. Additional soil and timber data were collected by field visits. The soil based-GIS made the land use decision-making process more accurate, automated, and efficient.

Precision pest management is an approach emphasizing that pest control measures should be applied only to those areas where it is needed. Virginia Tech researchers are developing a methodology using remotely controlled miniature aircraft to acquire information on insect-induced stress conditions in crop fields to create maps showing the areas affected by insects. The maps will be used to guide precision application of

pesticides. This research is expected to result in technologies and methodologies that can be quickly and economically commercialized and made available to farmers.

Organic Agriculture

Organic Cucumber and Squash Production: The market for organic produce has grown by more than 20 percent annually since 1990, yet Virginia organic production is inadequate to meet market demand. Production of pesticide-free vegetables is a major constraint limiting Virginia production. VAES researchers found no loss of yield using the insect-repelling quality of aluminum-coated plastic and planting rows of dill and buckwheat to the side of the cucumber rows to attract and sustain natural enemies of cucumber beetles. Squash and cucumbers produced with these techniques can be direct marketed as pesticide-free at a 25 percent higher price. The higher prices when combined with savings because insecticide applications were avoided greatly exceeded the higher price of aluminum-coated mulch.

Applied research is being conducted at Virginia State University to promote organic agriculture as a niche market for small farmers. Organic research and demonstration plots have been established at Virginia State University's Randolph Farm. Research is focused on determining organic production economic costs and returns, the effectiveness of non-chemical control of insects and diseases, and the effectiveness of using cover crops, compost, and other organic fertilizers to maintain soil fertility. A field day was held at the University to show case this form of agriculture to producers. An Extension publication was developed on the topic and distributed to all Extension offices throughout the state.

Agricultural Profitability

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

Virginia Retained Ownership Program. Fierce competition within the fragmented beef sector of the agriculture industry has resulted in per-capita beef consumption slipping as poultry and pork have gained market share. The Virginia Retained Ownership Program, sponsored by Virginia Cooperative Extension, provides financial incentives for all levels of the industry to ensure high levels of quality. Three Virginia farmer groups are sending approximately 5,000 cattle a year to western feedlots. Because the farmers own the cattle until they are slaughtered, the consumer market more directly affects the income they receive.

Plant Germplasm

Disease-Resistant Wheat and Barley. Development and commercialization of disease-resistant cultivars has increased production in Virginia by 2 million to 4 million bushels, resulting in an increase in revenue of as much as $7 million annually. Since 1989,the VAES breeding program has released more than 15 small grain cultivars that have provided producers with a farm-gate revenue exceeding $950 million. In addition this research and development allows growers to continue production with reduced use of pesticides, thereby protecting the environment.

Vegetable soybeans harvested at immature seed stage are consumed as a vegetable, much like green peas or lima beans. When harvested at seed dry stage they could be used for different soy food products. Soybean seeds contain phytochemicals that affect the course process that leads to heart disease and osteoporosis. Researchers at Virginia State University Research Station evaluated thirty-one vegetable soybeans from Maturity groups (MGs) III to VI. The immature green seeds were analyzed for genistein, daidzein, glycitin, and total isoflavones contents. Significant differences were observed among the genotypes for most of the seed traits analyzed. These suggest that genetic variability existed to make improvement through breeding. A highly significant genotype by year interaction was observed for all the parameters studied. This interaction was the result of a change in magnitude and rank of the differences between genotypes in the different years. The significant interaction observed suggests that genotype performance or response was not stable from one growing season (year) to another. Therefore, multiple year testing is required to make unbiased genotypic selection. Significant differences were also observed among the MGs for all seed traits. Seed traits are interdependent and the associations among them were positive and significant; suggesting that simultaneous selection and improvement is possible.

Developing Potato Lines for Research. VAES researchers have developed the only homozygous lines of potatoes -- potatoes with genetic information from just one parent -- available for use in genetic studies. Developing lines of potatoes with specific traits of economic and agronomic importance is a long-term, arduous affair. What makes crossbreeding efforts so difficult is that one of each set of matched genes masks the other, producing dominant and recessive traits. With one homozygous parent, all of the variation in the progeny can be attributed to the other parent, thus simplifying the study of the impact of specific alleles on traits of interest. These lines have been made available to other potato-breeding programs. This germplasm should assist the application of marker-assisted selection in potato by simplifying the genetic structure of populations.

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	125.9	6.8	0.0	0.4	16.0	0.0
2002	125.9	6.8	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

Universities in general and Virginia Tech specifically have major roles in ensuring food safety through the research, teaching and extension programs. 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) 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 rapid detection methods, predictive modeling systems for food safety, processing techniques to eliminate or reduce pathogens, development of procedures to prevent pathogen contamination, and management practices, etc.

Food safety is addressed by extension through workshops with producers, processors, distributors, retailers and consumers. In addition, extension personnel work directly with each clientele group on food safety issues. 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 0157:H7 and others. Programs are on going 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. 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 the 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.

OBJECTIVE 1: To improve access to an affordable, healthful, and culturally relevant food supply.

Performance goal 1: To annually increase the research and knowledge-base available from CSREES partners and cooperators on food accessibility and affordability.
Indicators: Number and type of significant research underway or proposed on food accessibility and affordability.
Evaluation framework: CRIS reports will be examined to document significant research underway or proposed on food accessibility and affordability.

2000 Indicator results:
Twelve research projects are either underway or proposed in the area of food accessibility and affordability.

Performance goal 2: To annually increase consumer awareness, understanding, and information on food accessibility and affordability in which CSREES partners and cooperators plan an active research, education, or extension role.
Indicators: The total number of persons participating in non-formal consumer education programs on food access and food affordability.
Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System.

2000 Indicator results:
A total of 29,208 persons participated in non-formal consumer education programs on food accessibility and affordability.

Performance goal 3: To increase the effectiveness of constituent and citizen participation on public policy issues affecting food security (i.e., food access, affordability, and recovery).
Indicators: The total number of persons participating in non-formal education programs on public policy issues affecting food security (i.e., food access, affordability, and recovery).

Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System.

2000 Indicator results:
A total of 5,645 persons participated in non-formal education programs on public policy issues affecting food security.

OBJECTIVE 2: To improve food safety by controlling or eliminating food-borne risks.

Performance goal 1: To annually increase the research and knowledge-base available from CSREES partners and cooperators on food safety and food borne risks and illnesses.
Indicators: Number and type of significant research underway or proposed on food safety and food borne risks and illnesses.
Evaluation framework: CRIS reports will be examined to document significant research underway or proposed on food safety and food borne risks and illnesses.

2000 Indicator results:
Five research projects are either underway or proposed in the area of food safety and food borne risks and illnesses.

Performance goal 2: To annually increase consumer awareness, understanding, and information regarding food safety and food borne risks and illnesses in which CSREES partners and cooperators play an active research, education, or

extension role.
Indicators: The total number of persons participating in non-formal, consumer education programs on food safety and/or food borne risks and illnesses. The total number of individuals completing food handler certification programs conducted by CSREES partners and cooperators on an annual basis.

Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System.

2000 Indicator results:

A total of 728 individuals completed food handler certification programs conducted by CSREES partners and cooperators.

Key Themes

Food Accessibility and Affordability

As a result of Virginia Cooperative Extension developing six crop pest management fact sheets on Virginia's major fruit crops (apples, peaches and nectarines, cherries, strawberries, grapes, and brambles), USDA was provided with the means to develop transition strategies for farmers facing the regulatory impacts of the Food Quality Protection Act.

Shredded cheese has become an important dairy product for institutional and retail consumers. Virginia Tech researchers are looking at innovative modified atmosphere packaging to keep the cheese fresh longer. The recommendations developed by the university for packaging procedures and the use of anti-mold additives are being adopted by the industry, and have been primarily responsible for a markedly reduced rate of spoilage of cheese products.

Food Handling

Virginia Cooperative Extension provided training assistance to dairy processors in the topic areas of personal hygiene, sanitation, Listeria, and good manufacturing practices. As a result of the training, all dairies have increased product shelf life and have a better monitoring program in place.

In 1999, 12 Virginia Cooperative Extension Family and Consumer Sciences Nutrition and Wellness Agents administered 28 courses reaching 493 foodservice professionals. Four hundred and two foodservice professionals (81.5%) obtained national certification.

As of July 30, 2000, 12 Virginia Cooperative Extension Family and Consumer Sciences Nutrition and Wellness Agents administered 19 courses reaching 326 foodservice professionals. Three hundred and twenty-six (85.3%) obtained national certification.

Virginia Cooperative Extension Family and Consumer Sciences Nutrition and Wellness Agents provide a 6-hour food safety course for food handlers and volunteers at church

functions, reunions, fairs, festivals, and temporary events (i.e. street vendors). The Occasional Quantity Cook Course concentrates on safe food handling and preparation of large quantities of food, especially in the areas of cooking, cooling, hot-holding, and reheating of potentially hazardous food. In 1999, 499 volunteer food handlers completed the course. Thirty-three percent of course participants who took pre- and post-test exhibited a 22% gain in food safety knowledge.

Food Safety

Virginia Cooperative Extension conducted two acidified foods workshops (multi-state cooperation) in Virginia and West Virginia to allow companies to meet FDA regulations. All the participants received certification and registered their products with FDA. Without this certification these companies could not continue to stay in business. Inspection of the facilities by food regulators indicate that 100% of the participants trained are following procedures learned in the workshops.

A web site was established for fish and shellfish dealers in Virginia and other states. The site contains information on harvesting and processing issues to permit firms to introduce safe and wholesome products in the market place. Information on the site includes a 7,000 quality and safety citation bibliography on chemical, physical and biological composition and properties; information on good aquaculture production and processing practices; and descriptions of over 200 web sites containing information on fish and shellfish species; regulations; market forms; quality and safety issues; and marketing, business, and economics.

Foodborne Pathogen Protection

Approximately 300 Virginia poultry growers and industry personnel were educated through the Poultry Production and Nutrient Management Symposium on cost-effective and applicable on-farm management strategies to reduce levels of food-borne pathogens on the final product while resulting in increased health and productivity of birds during live production. Approximately 70% of attendees reported this information moderately to greatly improved their skill and knowledge level.

In a Virginia Cooperative Extension educational program funded by the Accomack and Northampton Boards of Supervisors, 373 homeowners participated in an area-wide water-testing program for 13 different possible contaminants. Twenty-three percent of the samples tested were found to have above the allowable limits of coliform bacteria. All citizens who had well water problems were referred to their local health department so that the source of water pollution could be identified and the problem alleviated.

In Virginia, the 1999 King William and King & Queen Household Well Water Education and Testing Program allowed citizens to have both standard quality testing and pesticide testing conducted on well water at a reduced cost. Standard water quality testing was conducted on water supplies from 191 private residences and 9 churches and community

buildings. Estimated savings over using a private laboratory for the citizens and community groups involved was $26,000. Pesticide screening was conducted on water supplies from 10 private residences. Estimated savings over using a private laboratory for the citizens involved was an additional $9,000. Surveys indicated that, as a result of this educational program, 53% of participants (representing about 100 wells serving 250 people) took or planned to take additional action to protect or improve the quality of their home water supplies.

A Rockingham County farmer, through a Virginia Cooperative Extension household water testing program, discovered that his family's drinking water was contaminated by bacteria and nitrate, indicating that surface water was getting into his well. Through information provided in Extension's Farm*A*Syst Program, he was able to take inexpensive wellhead production measures to remedy the situation.

"Drop" apples, those that fall to the ground before harvesting, are often used in the production of apple cider. Virginia Tech researchers are investigating the ability of bacteria, especially *E. coli*, to migrate into the flesh of apples while on the ground. This research is expected to lead to recommendations on cultural practices to minimize the potential for bacterial contamination of "drop" apples.

HACCP

A statewide training program for food processing plant employees in Virginia was conducted in the areas of Hazard Analysis and Critical Control Point (HACCP) programs, Good Manufacturing Practices (GMPs), and foodborne hazards. Among the 419 participants, there was a 30% increase in the number of participants who could understand the purposes of HACCP and who could accurately identify potential foodborne hazards during processing.

A two-day HACCP (Hazard Analysis and Critical Control Points) and a three-day Train-the-Trainer workshop was presented to 106 representatives of the medical device manufacturing industry. The workshop was presented at the request of the medical device industry since a HACCP based inspection of their facilities, rather than a traditional inspection, by the U. S. Food and Drug Administration (FDA) is estimated to save each company a minimum of $100,000 annually. A HACCP Alliance was formed with representatives from the FDA, medical device manufacturing industry, and Virginia Cooperative Extension.

Assistance was provided by Virginia Cooperative Extension to 48 meat packing plants in Virginia through assessment of their Hazard Analysis and Critical Control Points plans for complying with regulatory requirements and improving safety of products they manufacture.

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	11.4	0.0	0.0	0.0	0.0	0.0
2002	11.4	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

Extension and research faculty at Virginia Tech and Virginia State represent expertise in nutrition, exercise science, and health education. Research strategies focused on consumer behaviors, the investigation of enhancing food products for greater nutritional value, and the benefits of certain nutrient rich foods. Chronic diseases such as coronary heart disease, hypertension, diabetes, osteoporosis, and cancer take a heavy toll on

individuals, families, and communities in terms of quality of life, sickness and disability, and health care expenditures. Despite considerable effort over many years, the interrelationships of food, nutrients, physical exercise, and heredity in determining risk of disease and disability are still not fully understood. The effects of micro-nutrients or particular vegetable proteins or fiber are areas of current inquiry. On-going research at Virginia Tech is directed toward dietary and activity behaviors that influence chronic disease risk, particularly, cardiovascular disease. A current project is exploring the relationship between dietary fat, fiber derived from a wood product, exercise patterns, and serum lipid profiles using an animal model.

Another aspect of this work is the mechanism by which soy protein exerts a favorable effect on serum lipid profiles, and recipes for baked products incorporating soy protein, suitable for household use, are being developed and tested by consumer panels. Collaborative work of researchers across colleges has resulted in the development of consumer-acceptable fat-substituted products made with soft red wheat that are low in fat and support the current dietary guidelines that encourage increased use of grain products. This work was extended to focus on batter characteristics such as "stickiness" that influence the application of these product formulations to commercial baking using large scale mixers. Techniques developed by the Virginia Tech Center for Sealant and Adhesive Science were adapted for use in evaluating the physical characteristics of batters and doughs.

Increased attention was directed toward the role of micro-nutrients such as folate in the development of atherosclerosis. Researchers investigated the effect of folate intake and genetic influence on homocysteine metabolism in older humans. Molecular biology methods provided an opportunity to examine the effect of gene expression on nutrient requirements and metabolism in human subjects. Molecular biology was also used to determine the influence of vitamin B-6 status on immune function using an animal model. The effect of marginal vitamin B-6 status on immune function is particularly relevant at this time as recent work suggests that vitamin B-6 requirements may increase in older age and inadequate intakes could be related to the compromised immune function observed in some elderly people.

Regular physical activity combined with a healthy and adequate food intake promotes physical well-being at all ages, and slows the loss of muscle leading to weakness and disability at older ages. Exercise science researchers evaluated the effect of consistent exercise and nutritional supplements on muscle metabolism and muscle strength in young subjects. Muscle fiber studies using animal tissues concentrated on those changes in muscle contractile proteins that resulted in cardiac failure or physical disability.

Educational strategies included nutrition and health education that promoted the development of positive practices and lifestyle behaviors among youth and to encourage appropriate behavior change in adults. The Dietary Goals for Americans that define a healthy and varied diet with generous intakes of complex carbohydrates and fiber and limited intakes of fat, saturated fat, sodium, and sugar provide the foundation for

programs directed to all age groups. An active lifestyle that includes regular walking or other physical activity prevents the development of obesity and assists in weight loss or weight management if inappropriate weight gain has already occurred. Regular physical activity coupled with recommended intakes of calcium supports the normal development of bones in childhood and adolescence and reduced loss of bone mass and risk of osteoporosis and bone fracture in later life. Smoking increases one's risk of all major chronic diseases including osteoporosis and avoidance of smoking or smoking cessation will lower the incidence of health problems and consequent health care costs. Despite the strong public interest in health and fitness, many individuals are misinformed about recommended dietary changes or appropriate levels of physical activity, and are not convinced that such changes carry benefit for them.

People of all ages and income and educational levels need guidance on what dietary changes to make and how to incorporate these changes into a normal eating pattern using accessible foods. Enjoyment of food is a basic consideration for most people and, to be successful, nutrition education programs must teach participants how to choose and prepare tasty, appealing food that is consistent with their cultural or ethnic background and available resources. When working with low-income audiences with limited literacy skills, a sense of hopelessness, and multiple problems that interfere with the procurement and preparation of adequate amounts of wholesome food, empowerment and motivation become particular challenges for the nutrition educator. The adoption of a more active lifestyle by all population groups requires the health educator to provide both motivation and a sound knowledge base, particularly for those individuals who may have been leading a sedentary lifestyle and must gradually change their activity pattern.

Internal and external linkages

Nutrition education and health promotion activities delivered in the reporting year addressed the needs of Virginians of all ages. Appropriate patterns of food choices, as well as food safety, were emphasized in programs for daycare providers. These workshops addressed nutrition issues such as menu planning and snack selection that mirror the Dietary Goals and promote fruits and vegetables and high calcium foods.

Several collaborative programs involved the pooling of resources to provide nutrition and health education to children of school age. Virginia Cooperative Extension has a strong working relationship with the Virginia Department of Education School Nutrition Program, including the USDA supported Team Nutrition. In-school programs related to nutrition were coordinated with 4-H activities in each locality. A new curriculum was developed for delivery at the six 4-H educational centers to teach healthy food and exercise patterns. Hands-on workshops for school food service personnel were delivered through joint efforts of the Virginia Department of Education, Virginia Tech, and the National School Food Service Institute.

Extension faculty members were active participants in the Virginia Osteoporosis Coalition that represents a joint effort of the Virginia Department of Health, Medical College of Virginia, and local community agencies. Programs included work with

school children, adult education, and workshops for health professionals. Virginia Extension educators were involved at all levels. In many of these examples distance education technologies was used to facilitate.

Adults were reached through a variety of activities coordinated with businesses, other state agencies, and local voluntary groups and organizations. Lunch time classes in the workplace that address healthy eating or weight loss were successful in several communities in reaching workers who because of time commitments or transportation problems do not attend evening programs. Active participation of county extension faculty in the state's continuing transition from Welfare to Work program included classes addressing personal health issues and the need for appropriate diet and lifestyle choices. The Welfare to Work program is reaching many ethnic and cultural groups that are traditionally under-served with health care and information. Enabling a high level of self-care can both enhance quality of life and reduce future health care costs. Needs of senior citizens for diet- and health-related information were met through programs held at congregate meal sites and senior centers in cooperation with Virginia Area Agencies on Aging. Lessons stressing good calcium sources and walking for maintaining bone health were especially important with older audiences. Workshops that provided guidance in meal planning and healthy choices addressed the needs of dietary managers at community care homes and residential homes for developmentally impaired young adults and physically impaired older adults. Collaborative activities with local hospitals and local affiliates of voluntary health associations such as the Virginia Heart Association or Virginia Cancer Society were initiated. Such activities included sponsoring health fairs, classes, public access television programs, and other events. Virginia Extension Family and Consumer Sciences educators continued to develop and acquire materials such as mailed lessons to reach people who may not choose to participate in face-to face programs. The *Change of Heart* and the *In Care of Your Health* lesson series were found to result in behavior change in particularly around choices of fewer high fat food items and more fruits and vegetables. On-going collaborative education activities with the Virginia Small Grains Board has resulted in workshops for Virginia Extension educators focusing on lowfat grain foods and a series of newsletters for consumers.

Two current national public health initiatives emphasizing increased consumption of fruits and vegetables and calcium-rich foods received attention through research. Researchers collaborated to develop edible coatings for fresh fruits and vegetables that would increase their shelf life, making them more attractive to consumers and maximizing the profitability for Virginia fruit and vegetable growers. Other researchers collaborated across departments in the development of reduced lactose dairy foods suitable for lactose intolerant populations that include African Americans, many Hispanics, and older people. A second component of the dairy project involved the use of focus groups as a data-gathering tool with women of all ages to determine factors that influence their use of dairy foods, important sources of biologically available calcium. Results from these focus groups support the development of education programs and materials that will motivate increased use of dairy foods.

OBJECTIVE 1: To optimize the health of consumers by improving the quality of diets, the quality of food, the number of food choices, and providing health educational programs.

Performance goal 1: To annually increase the research and knowledge base available from CSREES partners and cooperators on human nutrition, and family and consumer sciences.
Indicators: Number and type of significant research underway or proposed on human nutrition, and family and consumer sciences.
Evaluation framework: CRIS reports will be examined to document significant research underway or proposed on human nutrition and family and consumer sciences.

2000 Indicator results:
Of the 241active projects listed on the Virginia Agriculture Experiment Station research portfolio, 53 (22 percent) have some focus related to improving the quality of diets, the quality of food, the number of food choices, and providing health educational programs. The scope of the research spans disciplines in 20 departments in four colleges at Virginia Tech as well as the School of Agriculture, Science & Technology at Virginia State University. Practically all the research relates to two themes within Goal 3: human health and human nutrition. The potential implications related to food production and consumer behaviors are significant.
Performance goal 2: To annually reduce the health risk factors through non-formal educational programs to improve dietary habits and physical exercise practices in which CSREES partners and cooperators play an active research, education, or extension role.
Indicators: The total number of persons completing non-formal education programs on better management of health risk factors (e.g., obesity, hypertension, etc
Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System.

2000 Indicator results:
Non-formal education programs on better management of health risks were delivered to 12,226 individuals. Each of these participants was engaged in at least four hours of educational delivery. Agents and specialists were assisted by 880 volunteers in program delivery.

Performance goal 3: To annually increase consumer awareness, understanding, and information on dietary guidance and appropriate nutrition practices in which CSREES partners and cooperators play an active research, education, or extension role.
Indicators: The total number of persons completing non-formal nutrition education programs that provide dietary guidance to consumers.
Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System.

2000 Indicator results:

Non-formal education programs that provided dietary guidance to consumers were delivered to 18,220 individuals. Each of these participants was engaged in at least four hours of educational delivery. Additionally, thousands received information through health fairs, media releases and other mass communications. Extension agents and specialists were assisted by 2,735 volunteers in the delivery of programs.

Key Themes

Human Health

Research at Virginia Tech is providing evidence that use of persistent organochlorines insecticides may have posed a risk to a large segment of the population for the development of Parkinson's disease in old age.

Transgenic animals are efficient, cost-effective, and safe systems for obtaining complex therapeutic proteins that may be utilized for treatment of numerous life-threatening diseases in humans. The mammary gland has outstanding biosynthetic capabilities, and, for numerous reasons, pigs bio-engineered to express these products in their milk at lactation are the best production models. Virginia Tech researchers have produced pigs that express several proteins of critical importance in the blood clotting and anti-clotting cascade, including human Protein C, Factor VIII, Factor IX, and fibrinogen, in their milk at lactation. This work has the long-range potential of producing human therapeutic proteins that are safe, efficacious, and available in ample quantity to fill a current void in supply. Availability of ample, cost-effective quantities of these products will potentially save human lives.

Encephalitis is a debilitating viral disease that infects the human brain, causing confusion, headaches, disorientation, stupor, and sometimes death. La Crosse encephalitis virus is the leading cause of encephalitis in children in the U.S. Mosquitoes that breed in tree holes and artificial containers carry the virus. Between 1975 and 1993, only 1 case was reported from Virginia. However, between 1994 and 1999 there have been 12 confirmed cases. Researchers have obtained the first isolation of La Crosse virus from Virginia mosquitoes, demonstrating that the virus is an established and important health issue in the area. Public education programs are also being developed to teach people how to reduce their children's risk of infection.

There are compounds in the environment that act like natural estrogens and have the potential to disrupt normal reproductive functions and the immune system. Persistent low-level exposure to these compounds pose potential hazards to animal and human health. Researchers at Virginia Tech are investigating the impact to the immune system of zearalenone, a fungal-derived environmental estrogen. Understanding this impact is essential to developing strategies to avoid the potential negative consequences of the presence of estrogenic compounds in the environment.

An update on the use of pesticides on the farm and the measures taken to protect workers from exposure was provided to 136 Virginia healthcare workers at the 1999 Migrant Health Conference held in Abingdon.

Through a grant secured from the Virginia Department of Health, the book "AgMed: A rural practitioner's guide to agricultural medicine," was reprinted by Virginia Cooperative Extension and distributed to health care workers throughout the Commonwealth.

Through seven meetings conducted by Virginia Cooperative Extension, 378 commercial pesticide applicators were shown how to manage pesticide spills and related pesticide emergencies. A fact sheet containing this information was developed for future use by Extension Agents and cooperators.

Tobacco growers in Virginia were informed of the benefits and use of the new Tracerä and Spinosadä insecticides, which are an effective alternative to organophosphate and carbamate insecticides, and result in less human exposure than other forms of pest control.

To increase public awareness of the importance of good personal hygiene in reducing the spread of disease, 19,000 hand-washing posters, titled "The Proper Way To Wash Your Hands," were created and designed by Virginia Cooperative Extension. During September Food Safety Education Month, restaurant foodservice managers were encouraged by VDH Environmental Health Specialists to place the posters in public restrooms. Virginia Cooperative Extension and The Virginia Department of Health jointly funded the project. In addition, programs have been conducted to increase awareness of cancer and HIV at Virginia State University.

Human Nutrition

The work of one Virginia Tech researcher has shown that inadequate dietary vitamin B6 can dramatically affect the immune system. Nutrient intake data for the US estimates that 30% of women and up to 50% of elderly do not consume enough of the vitamin and therefore are at risk for developing B6 deficiency. A better understanding of how B6 influences immune cells, additional research will determine vitamin B6 intakes that will promote optimal functioning of the immune system.

Dairy products are an important part of the American diet; however, fat composition of dairy products is negatively perceived because of the high saturation level and cholesterol content. Virginia Tech researchers have successfully emulsified highly unsaturated butter oils and milk fat natural milk components to form cream. These emulsions mimic the microscopic, chemical, and physical characteristics of natural cream, and have modified fatty acid profiles. This research has the potential to lead to a range of dairy products with an improved nutritional profile and with a lower cholesterol level. This, in turn, could improve the health of many Americans.

Overweight and obese individuals are three times more likely to encounter heart and circulatory problems than normal-weight individuals. Food selection is one way in which individuals can make a difference in body weight. Virginia Tech nutrition researchers have developed a reduced-fat muffin that is equal to the eating qualities of a full-fat muffin. The fat content of the muffin has been reduced by 75 percent, and it has 300 calories per serving. Local bakeries have adopted the formulation, thereby increasing the number of convenient, reduced-calorie items available to the consumer.

In Virginia's Mecklenburg County, 28 people participated in "Eating for Healthier Tomorrow," a developmental low-fat eating course. Seventy two percent (72%) of the participants surveyed reported reduced fat intake by 50% and reduced calorie intake by 25%.

The "Change of Heart" home study course was offered throughout the Commonwealth of Virginia to approximately 3,000 people. A random sample evaluation of participants demonstrated significant changes: 76 % had increased their physical activity; 80% had increased their skills in reading labels; and 93% had improved their cooking methods to lower their intake of fat, saturated fat, and cholesterol.

"School Nutrition Education Series" (four 45-minute lessons) were taught for 1,629 second and third graders in 16 schools in Virginia's Planning District 4. Two lessons were on increasing the dietary intake of fruits, vegetables, and whole grains. Cumulative results show 75% tried at least one new food, 49% tried two or more new foods, 75% started reading labels, and 80% increased the number of fruits and vegetables eaten in a day. Teacher program evaluations were excellent with documented improvements in eating behaviors and nutrition knowledge of students.
Nearly 27,000 Virginia 4-H youth participated in food, nutrition, and health related projects and programming opportunities. The 4-H Pyramid Chef continued to be utilized with educators, youth, and 4-H camp participants. Cooking with CHARACTER was utilized with both extension agent and volunteer staff development events during the year, resulting in increased awareness and understanding of food safety and nutrition

Virginia Cooperative Extension agents delivered seventy-one (71) programs to a total of 1,180 three- and four-year- olds on grains, fruits, and vegetables. Pre-tests and surveys indicated 10% of the participants were consuming the recommended servings of fruits, vegetables, and grains. After participating in the programs, 30% of the youth were consuming the recommended servings, thus indicating an increase in the number of youth consuming the recommended servings of fruits, vegetables, and grains.

Nineteen (19) child care providers in Buchanan County (Virginia) participated in training to gain additional information on how they can improve the nutrition provided in their child care programs. Sixty nine percent (69%) of the participants reported changed practices due to the information they gained from the sessions.

Among 2,634 adults and 10,753 youth statewide, who completed at least six lessons in Virginia's Expanded Food and Nutrition Education Program (EFNEP) participant surveys provided the following impact data:

- 95% of homemakers made positive changes in at least one food group.
- Homemakers increased their intake of servings from certain groups of the Food Guide Pyramid by an average of 0.5 servings (e.g. Breads/Cereals/Pasta, Vegetables, Fruits, Milk/calcium foods).
- There were improvements on mean intake of nutrients as follows:

a. Fiber increased from 11 grams to 16 grams/day.
b. Calcium intake improved from 56% RDA to 75% RDA.
c. Iron, vitamins A, C, and B6 were below 70% RDA at entry, but increased to above 80% RDA at exit.

- 87% of homemakers improved in one or more food resource management practices such as (a) planning meals ahead of time, (b) using a grocery list, (c) comparing prices and checking Nutrition Facts on food labels to make food choices in the grocery store.
- 69% of homemakers improved one or more food safety practices, such as thawing frozen food properly, not leaving milk and meat-containing foods out of refrigerator for 2 hours or more, and washing their hands before touching food.
- 60% of homemakers began planning the use of household money to allow more funds for food and improved their menu planning and food buying practices
- 51% of households less often ran out of food before the end of the month or had to resort to eating less due to lack of money for food.
- 79% of youth indicated they were selecting nutritious, low-cost foods as a result of the lesson series.
- 75% of youth increased their knowledge of essentials of human nutrition.
- 75% gave responses indicating desirable food safety and food preparation practices.

- 70% indicated desirable practices related to eating a variety of foods and reducing intake of the Fats/Sweets Group.

Among 3000 adults and 2516 youth who completed at least six lessons in Virginia's Smart Choices Nutrition Education Program (SCNEP) participant surveys provided the following impact data:

- 92% of participants made positive change in at least one food group.
- Participants increased their intake of servings from certain groups of the Food Guide Pyramid by an average of 0.5 servings (e.g. Breads/Cereals/Pasta, Vegetables, Fruits, Milk/Calcium foods).
- There were improvements on mean intake of nutrients as follows:

a. Fiber increased from 11 grams to 14 grams/day.
b. Calcium intake improved from 50% RDA to 59% RDA.

c. Iron, vitamins A, C, and B6 were below 75% RDA at entry, but increased to above 75% RDA at exit.

- 86% of adult participants showed improvement in at least one food resource management practice such as planning meals ahead, using a grocery list, comparing food prices and using the Nutrition Facts on food labels to make food choices in the grocery store.
- 64% of adult participants showed improvement in one or more food safety practices, such as thawing frozen food safely (especially meat and milk products), and not leaving certain foods (milk, meats) out of the refrigerator for 2 hours or more.
- 52% of adult participants began making a plan for use of household money to allow more funds for food and improved their meal planning and food buying skills.
- 43% of households less often ran out of food before the end of the month or had to resort to eating less due to lack of money for food.

- 80% of youth gave responses indicating desirable food safety practices.
- 60% of youth showed improved nutrition practices such as eating a variety of foods and reducing intake of the Fats/Sweets Group.
- 60% indicated they were usually selecting nutritious low-cost foods.

The "Healthy You" program, an intergenerational program in Frederick County (Virginia) targeted at-risk 4-year-olds and senior citizens. Fourteen senior adults were trained as mentors to teach simple nutrition (8 lessons) concepts to preschoolers. The program goals: preschoolers to increase awareness of the variety of fruits and vegetables; learn to taste new food items. Senior citizens increased their awareness of their food consumption, a balanced diet and benefits diet. Qualified seniors were enrolled in SCNEP. There were 14 seniors and 14 children enrolled. Ten (10) parents participated in four workshops. Written evaluation revealed that 80% of the parents learned new skills in introducing their children to fruits and vegetables. A follow-up evaluation revealed: 100% of the 4- and 5-year-olds could recognize fruit and vegetables from other foods; 67% of the families were trying new foods; 50% tried new vegetables; and 50% included fruits and vegetables in the daily diet. Each of the 14 children improved in food selection during the taste tasting activities. Results show the children increased in their willingness to try and eat different fruits and vegetables.

"5-A-Day" was the theme selected for 2000 Nutrition Month programs for Bedford County (Virginia) students in public and private schools. Supported by a $2790 grant from Bedford Community Health Foundation, lesson plans and resource packets were prepared for teachers, nurses, librarians, and food service staff to enable them to deliver the "5-A-Day" lessons to 6,000 students. Five high school students prepared and performed a "5-A-Day" puppet show for 325 primary school students.

Seventy-five school age youth in a Culpeper County (Virginia) school received five nutrition lessons. A pre/post picture oriented assessment revealed that only one third of 3rd, 4th and 5th graders knew the food groups and the number of servings needed before

the lessons. The same test was given following the last lesson and two thirds of this group correctly matched the information.

Knowledge about sources of fiber in our diet was the criterion measured among 125 third graders in Madison County. A tool with food pictures was used where students circled high fiber foods. Only 38% of students selected 4 out of 6 high fiber before the lesson. Five months after the lesson, students were given the same tool and 70% made the correct selections. An interactive teaching strategy included inspecting and cracking grain, reading labels, and selecting foods to reach the student's daily fiber recommendation, based on their age. This lesson was part of a monthly food and fiber program and agriculture tour delivered by local Virginia Cooperative Extension agents.

Fifty-three percent (53%) of 16 food managers and school cafeteria participants who participated in the “Fresh Fruits and Vegetables to the Rescue” nutrition education class in Lancaster County (Virginia) responded that they increased the number of fresh fruits from one serving a day to two servings or doubled their fruit intake per day.

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	26.3	0.4	0.0	52.1	0.0	0.0
2002	26.3	0.4	0.0	52.1	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 (balance) between agriculture (production activities) and (stewardship and protection of) the environment.

Overview

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) erosion, water control and treatment structures, (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.

OBJECTIVE 1: To develop, transfer, and promote the adoption of efficient and sustainable agricultural, forestry, and other resource conservation policies, programs,

technologies, and practices, which may include alternative agricultural enterprises, that ensure ecosystems achieve a sustainable balance of agricultural activities and biodiversity.

Performance goal 1: To annually increase the research and knowledge-base available from CSREES partners and cooperators on environmental sciences and agriculture, including conserving, maintaining, and protecting ecosystem integrity and biodiversity.
Indicators: Number and type of significant research underway or proposed on environmental sciences and related topics.
Evaluation framework: CRIS reports will be examined to document significant research underway or proposed on environmental sciences and related topics.

2000 Indicator results:

Seventeen research projects are either underway or proposed in the area of environmental sciences and related topics.

The Virginia State University Agriculture Research Service (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 replace thus protecting the environment and water quality.

The VSU/ARS project, Development of Strategies To Use Farm Manures For Crop Production, addressed alternatives to the use of inorganic and nitrogen fertilizers by using farm animal manures in combination with organic matter to protect the soil, reduce fertilizer input costs and prevent water pollution from runoff, and promote a sustainable agricultural production system while increasing farmers/profits.

The VSU/ARS project, Removal of Pesticides From Plasticulture Runoff Using Vegetative Filter Strips, serves to determine the effectiveness of switchgrass and fall fescue filter strips in removing dissolved endosulfan and a cooper-based fungicide from plasticulture runoff. Vegetables grown using plasticulture is a large industry in the mid-atlantic and other regions of the U.S. 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.
The VSU/ARS project, Degradation of Atrazine and Metolachlor In Simulated Estuarine Sediment Water System, determined the effects of temperature and residence time on diffusion and degradation of 14C atrazine applied to the surface. The presence of atrazine in such waters is a concern, because the herbicide could adversely affect lake biota. Results showed that the potential impact of atrazine on aquatic plants associated with sediment would diminish with time because of dilution in the water phase, transformation to nontoxic products, and strong binding to soil particles.

These projects produced two referred journal publications in FY2000.

Performance goal 2: To annually increase agricultural producer awareness, understanding, and information regarding the adoption of agricultural production practices that sustain and/or protect ecosystem integrity and biodiversity in which CSREES partners and cooperators play an active research, education, and extension role.
Indicators: The total number of persons participating in non-formal education programs on sustaining and protecting ecosystem biodiversity while sustaining the profitability of agricultural production systems.
Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System.

2000 Indicator results:
A total of 39,774 persons participated in non-formal education programs on sustaining and protecting ecosystem biodiversity while sustaining the profitability of agricultural production systems.

OBJECTIVE 2: To develop, transfer, and promote adoption of efficient and sustainable agricultural, forestry, and other resource policies, programs, technologies, and practices that protect, sustain, and enhance water, soil and air resources.

Performance goal 1: To annually increase producer adoption of agricultural production practices that conserve and/or protect surface and groundwater supplies on or adjacent to agricultural production sites or land uses.
Indicators: The total number of persons participating in non-formal education programs on sustaining and/or protecting the quantity and quality of surface water and ground water supplies.
Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System.

2000 Indicator results:

A total of 69,606 persons participated in non-formal education programs on sustaining and/or protecting surface and groundwater supplies on or adjacent to agricultural production sites or land uses.

Performance goal 2: To annually increase producer adoption of agricultural production "best practices" that conserve, protect, and/or enhance the soil resources on or adjacent to agricultural production sites or land uses.
Indicators: The total number of persons participating in non-formal education programs on conserving, sustaining, and/or protecting soil resources.
Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System.

2000 Indicator results:

A total of 33,979 persons participated in non-formal education programs on conserving, sustaining, and/or protecting soil resources.

Performance goal 3: To annually increase the research and knowledge-base available from CSREES partners and cooperators on agricultural practices that protect, sustain, and enhance water, soil, and air resources.
Indicators: Number and type of significant research underway or proposed on agricultural technologies and practices that protect, sustain, and/or enhance water, soil, and air resources.
Evaluation framework: CRIS reports will be examined to document significant research underway or proposed on agricultural technologies and practices that protect, sustain, and/or enhance water, soil, and air resources.

2000 Indicator results:
Twenty research projects are either underway or proposed on agricultural technologies and practices that protect, sustain, and/or enhance water, soil, and air resources.

OBJECTIVE 3: To improve decision making on public policies related to agriculture and the environment.

Performance goal 1: To annually increase the research and knowledge-base available from CSREES partners and cooperators on public policy issues affecting agricultural production, the environment, and ecosystem integrity and biodiversity.
Indicators: Number and type of significant research underway or proposed on public policy issues affecting agricultural production, the environment, and ecosystem integrity and biodiversity.
Evaluation framework: CRIS reports will be examined to document significant research underway or proposed on public policy issues affecting agricultural production, the environment, and ecosystem integrity and biodiversity.
2000 Indicator results:
Eight research projects are either underway or proposed on public policy issues affecting agricultural production, the environment, and ecosystem integrity and biodiversity.

Performance goal 2: To annually increase the effectiveness of constituent and citizen participation on public policy issues affecting agricultural production, the environment, and ecosystem integrity and biodiversity.
Indicators: The total number of persons participating in non-formal education programs on public policy issues affecting agricultural production and ecosystem integrity and biodiversity.
Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System.

2000 Indicator results:
A total of 2,462 persons participated in non-formal education programs on public policy issues affecting agricultural production and ecosystem integrity and biodiversity.

Key Themes

Agricultural Waste Management

To address the implications of Virginia House Bill 1207 on local poultry producers and the poultry industry, the 3rd Annual Poultry Production and Nutrient Management Symposium was organized and coordinated in Rockingham County. The topics covered during the Symposium included balancing agricultural productivity and environmental productivity, an overview of the regulation and general permit requirements, a comparison of nitrogen and phosphorus based nutrient management plans, the fate of phosphorus in agriculture and the environment, and an introduction to the phosphorus index. In an evaluation of 306 participants, 88% of the attendees that returned their evaluation described the symposium as appropriate to very appropriate in regards to knowledge and skills gained to meet the poultry manure management regulations.

Virginia Cooperative Extension conducted training for 363 feed manufacturers, nutrient management consultants, and agricultural advisors on the use of the phytase enzyme in swine feeding programs to reduce phosphorus excretion in swine manure.

A Virginia Tech Extension Specialist in Agricultural Economics developed a concept plan on a poultry litter for grain exchange program for Virginia. The exchange would involve over 50,000 tons of litter and two million bushels of corn. Corn producers would have increased incomes of $2.5 million and poultry litter would be utilized in an environmentally friendly way.

Biodiversity

More than 80 breeds of livestock and poultry are declining in the U.S., many to the point of extinction. Virginia Tech researchers are working to preserve the unique genetic characteristics these breeds have to provide that may once again become important to American agriculture. Some populations have become more numerically secure; others have been dispersed to increase the number of sites breeding these animals. In both situations the risk of extinction has been decreased.

Biological Control

A Virginia Tech Extension Specialist helped develop a network of volunteers to assist in monthly water sampling in the Page Brook watershed in Clarke County. Results from the data collected on fecal source tracking indicated that livestock were a major contributor to fecal pollution in Page Brook. As a result of this information, farmers voluntarily fenced livestock away from streams, established watering points or in-pasture water stations, and developed riparian zone vegetation along the streams. Within less than a year, populations of fecal bacteria in the stream declined by over 90%.

Contamination by fecal bacteria is a common pollution problem in Virginia's rivers and streams. The bacteria are

introduced into the water by animals defecating in and near streams. Researchers at Virginia Tech have developed bacterial source tracking to identify sources of fecal pollution in water. DNA fingerprinting is showing the greatest promise of the several methods under development to track the source of bacteria. The sources of fecal pollution in one stream tested with BST were found to be livestock and wildlife. Best management practices were implemented to reduce livestock and wildlife access to the stream. Water quality in the stream improved, numbers of fecal bacteria were reduced by over 83 percent, and the stream now meets the standards for recreational uses.

Drought Prevention and Mitigation

Through participation in Virginia Cooperative Extension workshops, 50 Eastern Virginia irrigators became more aware of management decisions that will improve profit margins through savings in time, water, and energy, while also reducing environmental liability.

Two hundred forty beef producers in the Virginia counties of Frederick, Clarke, Shenandoah, Warren, and Page Counties received information on alternative feeds, forage resources, alternative water sources, livestock nutrition, marketing, and drought relief programs through a educational program called “Surviving the Drought.”

Energy Conservation

Cotton ginning in Virginia produces about 36 million pounds of waste per season. Disposing of this waste is difficult. Virginia Tech researchers have demonstrated in the laboratory that cotton gin waste can be converted into fuel ethanol. Successful development of this process to production scale could help solve the waste disposal problem; generate a new revenue stream for the industry; create an estimated 100 new jobs; and produce about 680,000 gallons of ethanol annually.

Wood and fiber must be dried prior to use in products. The drying of wood and fiber is very energy intensive. Results from research by Virginia Tech researchers are being investigated with industrial partners for modification of kiln schedules, water removal in paper manufacturing, and drying of wafers prior to manufacture of oriented strandboard. Identifying drying methods that reduce the moisture gradients that give rise to internal stresses and defects, and thereby reduce drying times, could potentially save up to one million Btu of energy per thousand board feet of production.

Forest Resource Management

As demand for forest products increases and area available for timber production decreases, the need for efficient management becomes acute. Virginia Tech researchers have developed comprehensive crop production forecasting models for forest stands subjected to intensive management practices, such as site preparation, vegetation control, planting genetically improved stock, thinning, and fertilizer applications. These stand

projection models are used regularly by numerous forest managers for prescribing silvicultural treatments and scheduling harvests.

Of the 750 non-industrial private forest landowners that completed the Virginia Forest Landowner Educational Program conducted by Virginia Cooperative Extension, 88 percent stated they would seek professional forest and wildlife management assistance. This represents the likely adoption of sustainable forestry practices, which would include best management practices to protect water quality and reforestation following harvesting on over 150,000 acres of non-industrial private forest lands.

Hazardous Materials

In a cooperative effort by Virginia Cooperative Extension and the Virginia Department of Agriculture, an estimated $4,640 in landfill costs were saved by collecting, granulating, and recycling 3,922 pounds of pesticide containers through a pesticide container recycling program in the City of Chesapeake targeted at farmers, nurseries, and other growers. In addition, 4,932 pounds of unknown, damaged, and excess pesticide products were collected from local farmers, greenhouses, and commercial businesses. The collection and recycling of these products resulted in the automatic reduction of potential hazards these products may have been to the environment and waterways of Chesapeake.

> In cooperation with the Virginia Department of Agriculture, Fluvanna County Virginia Cooperative Extension educational programs resulted in the collection and disposal of 24,000 pounds of pesticides and hazardous wastes to protect water supplies and reduce the risk of human and animal poisonings.

In cooperation with the Virginia Department of Agriculture, Northampton County Virginia Cooperative Extension educational programs resulted in the collection and disposal of 6,426 pounds of outdated, illegal, or unwanted pesticides and the recycling of 3,826 plastic pesticide containers.

Integrated Pest Management

Virginia Cooperative Extension educational programs, using on-farm test plots in Mecklenburg and surrounding counties, has resulted in complete adoption of in-row fumigation practices in tobacco fields, which reduces chemical use by 33 percent, and increases tobacco yield by 10 to 20 percent.

> As a result of their participation in the Pittsylvania County tobacco production Virginia Cooperative Extension meeting, approximately 15 tobacco producers reduced nitrogen use by 20 pounds per acre to increase profitability, improve tobacco quality, and improve water quality.

A peninsula golf course superintendent participating in an ongoing, developmental educational program on utilizing integrated pest management strategies on turf, documented a savings of over $3,000 in 1999 from decreased fungicide purchases as a result of improving the accuracy and effectiveness of his pest management decisions by

incorporating weather data and predictive turf disease advisories provided daily by local Virginia Cooperative Extension Agents.

Seven cooperating farmers employed integrated pest management practices on over 200 acres of Extension demonstration fields in the Cat Point Creek Watershed project conducted in the northern neck of Virginia. The cooperating farmers shared their results with other producers and stated that they will apply the same practices to additional crops and fields in the future affecting over 5400 acres.

Routine calendar-based applications of insecticide sprays are the most common method of pest control in schools throughout Virginia. These "preventative" applications put unknown quantities of potentially useless insecticides into a child's environment. Virginia Cooperative Extension provided training in integrated pest management for school facilities managers and their contract pest control personnel in Virginia's Planning District 4. Montgomery County Public Schools adopted a school IPM program. Calendar-based applications of spray formulation insecticide have been eliminated from the 24 schools in the district thus reducing exposure risk to 9,114 students and 1,860 school employees.

Natural Resources Management

Fast growing plantation forests on private lands are increasingly being used to produce the nation's wood needs. This system utilizes an agronomic management model of intensely managed cultivation. Virginia Tech researchers have established large, field-scale, rotation-length experiments throughout the Southeast to determine and demonstrate the effects of intensive forest management practices on forest productivity, soil quality, hydrologic function, water quality, carbon sequestration, and biodiversity. Aggressive presentation of these findings to industry has resulted in the application of new sustainable forest management approaches on thousands of acres of plantation forests.

Nutrient Management

A challenge for producers has been developing realistic and workable nutrient management plans while maintaining the viability of their farm businesses. Virginia Tech scientists developed a software program, NutMan, which makes it much easier to develop safe and profitable nutrient management plans for Virginia farms. Virginia Cooperative Extension specialists and farmers have used the program to quickly develop plans, balance their nutrient needs, and safely utilize animal waste. NutMan has been used to generate plans for hundreds of thousands of acres in Virginia.

Pesticide Application

Virginia Cooperative Extension is the primary pesticide safety educator in Virginia through the activities of its Extension Agents and Specialists. This program reaches every Virginia locality through organized educational programs, demonstrations, consultations, publications, audio/visual media, and Internet resources. In 1999, Virginia Cooperative

Extension conducted 202 workshops for Private Applicator Recertification Training for a total of 5,484 participants.

A survey of corn, soybean, and small grain farmers participating in one or more of 12 years of the Virginia Cooperative Extension Five County Agricultural Conference for producers in King and Queen, King William, Essex, Middlesex, and Caroline Counties showed that: 58% of the farmers had eliminated unnecessary fertilizer or pesticide inputs; 68% of the farmers had taken extra precautions in protecting themselves and the environment from pesticides; 58% of the farmers had increased their income through better marketing or use of government programs; 58% of the farmers had eliminated unnecessary tillage practices; and 68% of the farmers had switched to improved crop varieties.

Results of a 1999 Virginia Cooperative Extension survey documented a 27% increase in crop rotation practices from 1989 to 1999 and a decrease of 46% in continuous corn production on the same acreage. This shift away from continuous corn cropping practices eliminated the application of 24 tons of insecticide active ingredient from being applied to cornfields in Virginia.

Soil Erosion

In collaboration with the Loudoun Soil and Water Conservation District, Loudoun County Virginia Cooperative Extension provided technical resource recommendations for the promotion and implementation of Best Management Practices by farmers and landowners to install 72 livestock watering systems, eliminate access by livestock to over 50 miles of streams, and stabilize 26 critical erosion areas on farmland.

Through a cooperative education program conducted by Virginia Cooperative Extension and the Soil and Water Conservation District in New Kent County, 60% of grain crop production acreage was planted using continuous no-till practices compared to 10% in 1998. Continuous no-till planting improves soil and water conservation while preventing nutrient runoff.

Soil Quality

From July 1, 1999 through June 30, 2000, approximately 24,900 soil samples were analyzed by the Virginia Cooperative Extension Soil Testing Laboratory for an estimated 6,225 farmers and agribusiness personnel. Reports contain proper rates of fertilizer and lime use for optimum crop quality and yield with minimal potential for loss of nutrients to groundwater and surface water.

From July 1, 1999 through June 30, 2000, approximately 16,600 soil samples were analyzed at Virginia Tech for an estimated 4,150 individuals/businesses in the non-agricultural sector. Reports included recommendations on proper fertilizer and lime use to minimize losses to groundwater and surface water.

Orange County Virginia Cooperative Extension conducted a pre-sidedress nitrate soil test for corn on 24 cornfields. Eight out of the 24 fields were determined to be satisfactory, which resulted in a savings of 18,000 pounds of nitrogen that were not applied because of the test.

Sustainable Agriculture

As a result of Virginia Cooperative Extension educational programs, research, and demonstration projects, 90 percent of the Christmas tree acreage in Southwest Virginia is now being grown with sod suppression vegetation management, which results in greater sustainability and increased profitability.

Water Quality

Forty-one percent of the Virginia's population depends on groundwater as its only source of drinking water, and groundwater is an important source for many others. Planners need tools to assess groundwater vulnerability and to develop effective land use management plans to minimize contamination by pesticides. Virginia Tech researchers coupled a pesticide-screening model with Geographic Information Systems to assess the contamination potential of over 70 pesticides in Louisa County, Va. The model aids in a county-level evaluation of groundwater contamination potential by pesticides. It is also useful for land use planning in order to protect water resources and achieve water quality goals.

Yard Waste/Composting

Twenty Virginia Planning Commissioners learned the benefits and environmental consequences of composting during a mobile workshop that should result in the improved understanding of recycling organic wastes as an alternative to landfilling.

Six Virginia Cooperative Extension educational programs were conducted on composting for 142 farmers and landowners. As a result, over 70% of the participants have started using compost in their landscapes, approximately 30% of the participants have started making their own compost, and two farms developed commercial composting businesses.

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	54.8	0.6	0.0	1.6	0.1	0.0
2002	54.8	0.6	0.0	1.6	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.

Overview

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 during the reporting period by the programming efforts, accomplishments, and research provided by Virginia Cooperative Extension (VCE), representing both Virginia Tech and Virginia State universities.
Farm families, rural and suburban families, and families of urban populations benefited from Virginia Cooperative Extension's efforts to enhance economic opportunities and the quality of life for these citizens of the Commonwealth.

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.

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 reporting year, educational programs in these three areas reached nearly 1.4 million 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 an 18 percent increase of participation over 1998-99. Volunteer effort in support of the FCS program also increased over last year, as agents and specialists reported

7,331 volunteers contributed just short of 100,000 hours (99,587). This compared to 5,769 reported volunteers and 68,498 hours in 1998-99.

Largely due to increased collaborative programming with other state agencies, external funding support for the FCS program increased to $4.5 million. Nearly half ($2.6 million) of this amount is due to the continuing partnership between VCE and USDA's Food and Consumer Services with the delivery of nutrition educational programs targeted at food stamp recipients (Smart Choices Nutrition Education Program). Another significant collaborative effort that is worthy of note was the success of agents and specialists receiving grants from a special Department of Social Services collaborative partners program. Over $137,000 was received in support of 20 projects through this effort. Each of the supported projects was focused on enhancing the capacity of communities to respond to families' needs.

During the reporting year, Virginia 4-H programs reached 469,321 youth through schools and clubs. Of these, 128,243 were enrolled as 4-H members. Through a vast number of volunteers numbering 44,153, 4-H program efforts were supported and sustained. Volunteer commitment of these 4-H volunteers resulted in over 1,218,016 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.

OBJECTIVE 1: To increase the capacity of communities and families to enhance their own economic well being.

Performance goal 1: To annually increase the research and knowledge-base available from CSREES partners and cooperators on the economic well-being of communities and their citizens.
Indicators: Number and type of significant research underway or proposed on economic well-being of consumers, families, and communities.

Evaluation framework: CRIS reports will be examined to document significant research underway or proposed on economic well-being of consumers, families, and communities.

2000 Indicator results:
The Virginia Agriculture Experiment Station research portfolio is conducting approximately 180 research projects dealing with agriculture related studies, human nutrition, foods, and gerontology. Of these, 79 (44%) are focused on agriculture related to improving the capacity of communities and families to enhance their own economic well being.

Performance goal 2: To increase the capacity of local and state governments and their officials to effectively carry out their responsibilities, such as community strategic planning, zoning, other spatial and economic planning, land-use planning, and rural economic development, through programs in which CSREES partners and cooperators play an active research, education, and extension role.
Indicators: The number of public officials and community leaders participating in non-formal education programs on issues of government and rural economic development.
Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System and in-depth evaluations when available.

2000 Indicator results:
Approximately 1100 public officials and community leaders participated in non-formal education programs on issues of government and rural economic development during the reporting year.

> Virginia 4-H programs reached 469,321 youth through schools and clubs. Of these, 128,243 were enrolled as 4-H members. Through a vast number of volunteers numbering 44,153, 4-H program efforts were supported and sustained. Volunteer commitment of these 4-H volunteers resulted in over 1,218,016 hours of volunteer time, thus saving county and state government approximately $18,270,240 in funding.

Virginia FCS programs reached 18% more participants over the previous year. Volunteer efforts in support of the FCS program also increased, with 7,331 volunteers contributing 99,587 hours of time. This saved county and state government approximately $1,493,805 in funding.

Extension agents estimated crop damage and assisted county boards of supervisors throughout the Commonwealth in the drafting of county resolutions for disaster area declarations as a consequence of one of the worst droughts in the history of the State. Agents worked with grain and livestock producers to increase producer awareness of government relief programs offered through the Farm Service Agency, the Natural Resources and Conservation Service, and the Crop Insurance Agency.

Performance goal 3: To annually improve the financial status of families through financial management education programs implemented in which CSREES partners and cooperators play an active research, education, or extension role.
Indicators: The number of persons participating in non-formal education program on financial management including home-based businesses.
Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System and in-depth evaluations when available.

2000 Indicator results:
During the reporting period, 16,181 persons participated in non-formal educational programs on financial management including home-based businesses.
OBJECTIVE 2: To increase the capacity of communities, families, and individuals to improve their own quality of life.

Performance goal 1: To annually increase the incidence of caring communities resulting from non-formal education programs in which CSREES partners and cooperators, play an active research, education, or extension role.
Indicators: The total number of persons participating in non-formal education programs on community decision-making and leadership development. The total number of dependent care providers participating in non-formal education programs on dependent care.
Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System and in-depth evaluations when available.

2000 Indicator results:
During the reporting period, over 521,000 persons participated in non-formal education programs on decision-making and leadership development, while 2,819 persons were involved in non-formal education programs on dependent care.

Performance goal 2: To annually increase the incidence of strong families resulting from non-formal education programs in which CSREES partners and cooperators play an active research, education, or extension role.
Indicators: The total number of persons participating in non-formal education programs on parenting. The total number of persons participating in non-formal education programs on youth development.
Evaluation framework: Data to document achievement of this performance goal will come from the VCE Planning and Reporting System and in-depth evaluations when available.

2000 Indicator results:

The total number of persons participating in non-formal education programs on parenting during the reporting period was 125,441. The total number of persons participating in non-formal education programs on youth development was 113,902.

Performance goal 3: To annually increase the research and knowledge base available from CSREES partners and cooperators on increasing the capacity of communities, families, and individuals to improve their own quality of life.
Indicators: Number and type of significant research underway or proposed that will result in increasing the capacity of communities, families, and individuals to improve their own quality of life.
Evaluation framework: CRIS reports will be examined to document significant research underway or proposed that will result in increasing the capacity of communities, families, and individuals to improve their own quality of life.

2000 Indicator results:

A variety of research projects are underway that will hopefully contribute to the increasing the capacity of communities, families, and individuals to improve their own quality of life. During the reporting period, the research portfolio focused on this goal totaled 64 with 55 focused on qualitative research; 9 focused on quantitative.

Key Themes

Aging

Through 22 gardening activities at local nursing homes, Roanoke, Virginia Master Gardener Volunteers helped improve the quality of life for 282 patients involved in horticultural therapy programs.
A team of nine James City County, Virginia Master Gardener Volunteers implemented a horticulture therapy program for eleven elderly residents (88 to 97 years of age) in an assisted living, adult care facility. As the program was being conducted, the Activity Director for the facility reported that the one-on-one interaction between volunteer and client resulted in a markedly improved attitude by all participants, an increase in client participation in other daily activities, increased verbalization among clientele, and an increase/improvement in short-term memory.

In Virginia's Planning District 5, 40 Senior Companions increased knowledge about caring for older Americans and 34 (85%) adopted skills in applying aging characteristics and techniques with their companions.
Twenty-two (22) sixth grade students in PD 2 gained knowledge and a change of attitude by participating in Virginia Cooperative Extension's *Learning About Older Adults*, an in-school project. During the first lesson, students described older adults as cranky, gray hair, sickly, wrinkles. After nine (9) senior adults worked with the students, the concluding descriptive words were nice, lots of experiences, friendly, have a lot to learn from them.

Forty-seven (47) Grandparents Raising Grandchildren Support Group participants in Virginia's Planning District 16 learned about community resources. Evaluations showed that 92% of the participants have learned about additional community resources, 87% have used a new resource, and 89% have recommended the group to another individual. As a result of this support group and the information provided, the need for establishing a similar group in two other locations has been identified.

Elder Abuse lessons were presented three times in Virginia's Planning District 11 to the community at large, human service agencies, and senior centers. Pre-test scores (59% correct answers) and post-test scores (85% correct answers) document knowledge gained (26% individual improvement) for 55 participants. *Elder Abuse* lessons were also presented to 559 individuals in Virginia's Planning District 6. Ninety-five percent (95%) of participants indicated that they now understood the meaning of abuse and would visit their neighbors, friends, and families and observe and report suspected abuse.

Agricultural Financial Management

Over 1000 Virginia farmers participated in farm income tax training programs designed by Virginia Cooperative Extension to teach farmers basic tax management strategies. As a result, farmers in affected areas benefited from knowledge gained on tax deferral strategies for losses that occurred from the 1999 drought.

Extension Agents estimated crop damage and assisted county boards of supervisors throughout the Commonwealth of Virginia in the drafting of county resolutions for disaster area declarations as a consequence of one of the worst droughts in the history of the State and Hurricanes Floyd and Irene. Agents worked with grain and livestock producers to increase producer awareness of government relief programs offered through the Farm Service Agency, the Natural Resources and Conservation Service, and the Crop Insurance Agency.

Extension Agents worked with personnel from the Virginia Department of Agriculture and Consumer Services and the Virginia National Guard in hay and water relief distribution for livestock and dairy producers in drought affected areas.

Because of extremely low commodity prices and the drought, Extension provided direct assistance to 95 Virginia Shenandoah Valley farm families in decisions dealing with capital investments, multi-year cash flow analyses, enterprise budgets, and government assistance programs.

In cooperation with the local milk cooperative and an agricultural lender, Extension conducted the Dairy Financial Planning Seminar for over 100 Virginia Shenandoah Valley dairy farm families receiving large cash payments from the sale of their local milk marketing cooperative. As a result, producers were able to make more profitable investment, expansion, and retirement decisions.

Virginia Cooperative Extension workshops were conducted to help over 150 grain farmers develop detailed pricing plans for the year 2000. Producers following the plan should receive substantially more revenue for corn and soybeans than for farmers using no plan.

Virginia Cooperative Extension Agents helped plan and coordinate a multi-agency event where local and area residents made over 7000 visits to nine farms during the two-day Fauquier County Farm Tour. Participants had a chance to see first-hand how the agricultural commodities that they use in everyday life are produced. A workshop for five agriculture lenders and one equipment dealer was conducted in Sussex County to provide information on crop budgets, production costs, record keeping, and risk management. While this was a small group, it accounted for the lending of $12 million annually to 70 percent of Sussex County farmers.

As a result of Virginia Cooperative Extension educational programs, 54 producers committed to growing 242 acres of vegetables for the Clinch Mountain Farmers' Market. In 1999, over $220,000 in vegetable sales were generated, which was three times more than projected for the season.

The Bedford Agriculture Council, an Extension advisory group, developed the Bedford County, Virginia Family Farm Tour. This tour, which was targeted at the non-farm public, registered 200-300 people at each of five farm stops, and was supported by 32 volunteers, 200 hours of volunteer time, and $1450 in financial support.

Over 1100 residents increased their awareness of agriculture and Virginia Cooperative Extension educational programs through their participation in the Second Annual Farm and Family Celebration held at 13 farms in Caroline, King George, Stafford, and Spotsylvania Counties.

Two horse facility and pasture management seminars were conducted in northern Virginia. Of the 49 producers returning surveys, 46 indicated the information provided through the seminars would be useful to them in making pasture management decisions. As a result, Virginia Cooperative Extension Agents made eight farm visits within a month following the seminars to work with producers interested in improving horse pasture management.

Seventy individuals, including 48 new Virginia Cooperative Extension users, participated in the First Annual Lynchburg Area Horse Forum. All respondents to the meeting survey agreed or strongly agreed that they had a better understanding of the information presented, and rated the program a 4.6 on a 5 point scale.
For the City of Virginia Beach, 171 Virginia Cooperative Extension Master Gardener Volunteers provided 12,236 volunteer hours of support of Virginia Cooperative Extension educational programs. The garden hotline, which operates from March through October, provided assistance to 2,181 callers.

Virginia Cooperative Extension conducted three apple-grafting workshops in Giles, Floyd, Montgomery, and Pulaski Counties. A total of 58 persons learned to graft apple trees, including eight from the local Amish community.

Workshops conducted in the City of Danville by Virginia Cooperative Extension on growing food crops in the home garden resulted in 64% of the participants stating that their views had changed on fertilizer use, soil improvements, and irrigation.

Where participation had been historically low, the Extension Agent in Franklin County, Virginia, was able to increase German Baptist participation in Extension educational programs as a result of making individual farm visits. Eight farms are currently participating in Extension led research and demonstration projects.

Over 150 farmers participated in a series of Farm Financial Risk Management Conferences planned and conducted by Virginia Cooperative Extension in southeast Virginia. As a result, over 50% of the participants enrolled in a Farm Service Agency crop program, a Natural Resources and Conservation Service program, or bought crop insurance. The information presented at the workshops was posted on the Virginia Cooperative Extension public web site for use by farmers throughout Virginia and the United States.

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 650 farmers in 35 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. This past year, 12 loan applications were approved totaling more than $757,000. Records have been established for more than 70% of program participants.

Virginia Cooperative Extension computer workshops were conducted in three locations in Virginia to demonstrate the importance of farm records for enhanced decision making. As a result, an average of 78% of participants indicated an increased competence in farm management decisions.

A Virginia Cooperative Extension workshop entitled “The Importance of Cooperatives and Their Basic Principles” was conducted during Cooperative Month for a group of approximately 30 cooperative managers and their employees. As a result, the participants are more knowledgeable of the forces of change facing cooperatives and the implications of change on future business decisions.

Character/Ethics Education

Comprehensive programs focus on character and leadership development, violence prevention, tutoring, parent education and family support. Alexandria County, Virginia 4-H reported that 60 youth participated in an after-school homework center to assist youth in at-risk communities with homework completions, behavior modification and skill development. Students participating have improved their grades by 30%. parents and teachers have reported that the center has improved behavior that is a carryover in the class and home and the program provides a safe environment for the child.

Approximately 73,000 youth were 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, 45 school systems, 1 alternative school, and 3 military bases have joined as partners with 4-H in this program. Additionally, 79 adult volunteers were involved in staff development programming this year.

Two hundred ten (210) child care providers, who received training in CPR/First Aid, child development, nutrition, and discipline, etc., met child care licensing requirements, thus improving the quality of child care in Caroline County. In Pulaski County, Virginia, 48 youth, who received Super Sitter training demonstrated a 32% increase in knowledge about babysitting; 100 % reported a greater sense of confidence to help them become more effective sitters.

In Rockingham County, Virginia, the 4-H program has contributed greatly to the educational enhancement of the students. Since beginning the "Character Counts!" program there in 1998 the number of program, the school board contributes "Character Counts!" as a major factor in the reduction of discipline problems. Prior to beginning the program, in 1998, the board saw 13 cases a year. In 1999 they addressed 8 cases and in 2000 they have seen only 6 cases. 83.4% of youth in this program reported increase in knowledge and life skills,

Child Care/Dependent Care

Through Virginia Cooperative Extension, one hundred sixty-five (165) regional child care providers increased their knowledge of providing quality child care, and 78% (129 participants) adopted skills in anger management and violence prevention, promoting literacy and art, prenatal care, and Character Counts with children.

Through Virginia Cooperative Extension, ninety-three percent (93%) of 72 participants attending training sessions on "Creative Activities for School Age Children" and "Guiding the Behavior of Infants and Toddlers" reported gaining helpful information for use in their care of children. The sessions also provided 6 hours of continuing education credit for child care provider licensing.

Following a "first time provider" training in Russell County, Virginia, 100% of participants (17) indicated they received new information that would help them to provide better care for children.

Forty-seven (47) Grandparents Raising Grandchildren Support Group participants in Virginia's Planning District 16 learned about community resources. Evaluations showed that 92% of the participants have learned about additional community resources, 87% have used a new resource, and 89% have recommended the group to another individual. As a result of this support group and the information provided, the need for establishing a similar group in two other locations has been identified.

Nineteen (19) child care providers in Buchanan County, Virginia, participated in training to gain additional information on how they can improve the nutrition provided in their child care programs. Sixty nine percent (69%) of the participants reported changed practices due to the information they gained from the sessions.

Virginia State University has been conducting a program to prepare parents to operate day care centers. Twenty-seven persons have completed the training and 10 are currently enrolled. Pre and post-test-scores reveal that participants made 55-80% gains in child care knowledge. As a result of the training, most participants have reported that they have gained self-confidence and developed a greater sense of self-esteem and self-worth. They add that the training has enhanced their ability to better organize themselves and their families for work and has helped them develop a strong work ethic.

Children, Youth, and Families at Risk

Comprehensive programs focus on character and leadership development, violence prevention, tutoring, parent education and family support. Alexandria County, Virginia 4-H reported that 60 youth participated in an after-school homework center to assist youth in at-risk communities with homework completions, behavior modification and skill development. Students participating have improved their grades by 30%. parents and teachers have reported that the center has improved behavior that is a carryover in the class and home and the program provides a safe environment for the child.

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 results are making great impacts as evidenced by some of the following highlights:

Community Development

Eighty-five percent of the participants (43) in the Virginia Certified Planning Commissioners program reported that their knowledge of planning principles and practices improved as a result of participating in the 10-week program.

Of the 202 Incentive for Employment not Welfare (VIEW) participants involved in Virginia Cooperative Extension-delivered "work-readiness" training, 106.5 (52.5%) were able to gain employment in the Social Work/Family Services occupation.

Through the use of Virginia Cooperative Extension publications, a mine site in Wise County is being reclaimed to serve as an industrial site and major surface mining firms are using reforestation guidelines.

Through Virginia Cooperative Extension, eighty-two percent of the elected officials (145) participating the Newly Elected County Board of Supervisors Conference reported that their knowledge of local government improved as a result of participating in the three-day program.

Virginia Cooperative Extension formed a partnership with the Portsmouth Parks and Recreation Department to help provide volunteers and community education for beautification projects in the Portsmouth area.

Seventy-four percent of the participants (114) in the Virginia Certified Planning Commissioners program reported that their knowledge of planning principles and practices improved as a result of participating in the 10-week training program.

Consumer Management

Through Virginia Cooperative Extension, nearly 1,200 (1,188) participants of Home and Housing Education statewide increased their knowledge of choosing safe, affordable housing, and preventative home maintenance. Eighty-two percent of participants practiced home repair management skills, which resulted in approximate net savings of $60.00 per month per household in repair costs (total estimated savings of over $700,000).

Through Virginia Cooperative Extension, four hundred ninety four (494) limited resources homemakers (50% of 988) adopted recommended practices of priority spending and budgeting utilizing a budget worksheet for planned spending and savings; 25% have improved in the area of paying rent on time.

Estate Planning

Estate planning workshops were conducted by Virginia Cooperative Extension agents at four locations in Virginia to increase farmer awareness of the importance of estate planning. As a result, an average of 57% of participants indicated plans to contact an estate-planning professional to create or modify their estate plan and/or discuss their estate plan with their family and heirs.

Of the 108 households participating in estate planning workshops in Virginia's Planning Districts 4 & 5 a six-month follow-up questionnaire revealed:

- 7% made a will for the first time

- 41% made changes to an existing will
- 14% made an advanced medical directive
- 11% had written a letter of last minute instructions

Family Resource Management
Through educational programming conducted statewide by Virginia Cooperative Extension, eight hundred eighty three (883) participants of the Money 2000 Program saved $134,583 and reduced debt by $745,155 for a total of $879,738 in net family financial change.

Virginia Cooperative Extension's research-based 7-session parenting educational series, "Families First," was conducted five times in Planning District 11. Twenty parents who completed the “Families First - Keys to Successful Family Functioning" program increased their knowledge of healthy family functioning by an average of 50% from pre-test (39% correct answers) to post-test (89% correct answers). In addition, paired t-tests were administered to detect statistically significant differences between pre- and post-tests knowledge gain of healthy family functioning. Results reveal that a statistically significant change occurred at the .05 level on all seven tests.
Of the 202 Incentive for Employment not Welfare (VIEW) participants involved in Virginia Cooperative Extension-delivered “work-readiness” training, 106.5 (52.5%) were able to gain employment in the Social Work/Family Services occupation.

Home-based Business Education
Over 100 Farmers Participated In Virginia Cooperative Extension Educational Program Conducted In Southside Virginia On The Potential Profitability Of Using Tobacco Transplant Greenhouses For Supplemental Crops

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A Norfolk, Virginia participant of a Home-Based Business Conference received a $15,000 low-interest loan to support her porcelain doll business. Through continuing support and education provided by the local Virginia Cooperative Extension office, she has been able to sustain her business and is making loan payments on time.

Impact of Change on Rural Communities
Virginia Cooperative Extension Agents estimated crop damage and assisted county boards of supervisors throughout the Commonwealth in the drafting of county resolutions for disaster area declarations as a consequence of one of the worst droughts in the history of the State and Hurricanes Floyd and Irene. Agents worked with grain and livestock producers to increase producer awareness of government relief programs offered through

the Farm Service Agency, the Natural Resources and Conservation Service, and the Crop Insurance Agency.
Virginia Cooperative Extension Agents worked with personnel from the Virginia Department of Agriculture and Consumer Services and the Virginia National Guard in hay and water relief distribution for livestock and dairy producers in drought affected areas.

Because of extremely low commodity prices and the drought, Virginia Cooperative Extension provided direct assistance to 95 Shenandoah Valley farm families in decisions dealing with capital investments, multi-year cash flow analyses, enterprise budgets, and government assistance programs.

A Virginia Cooperative Extension workshop for five agriculture lenders and one equipment dealer was conducted in Sussex County to provide information on crop budgets, production costs, record keeping, and risk management. While this was a small group, it accounted for the lending of $12 million annually to 70 percent of Sussex County farmers.

Through the use of Virginia Cooperative Extension publications, a mine site in Wise County is being reclaimed to serve as an industrial site and major surface mining firms are using reforestation guidelines.

Jobs/Employment
Virginia Cooperative Extension workshops were conducted to help over 150 grain farmers develop detailed pricing plans for the year 2000. Producers following the plan should receive substantially more revenue for corn and soybeans than for farmers using no plan.

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Leadership Training and Development
Comprehensive programs focus on character and leadership development, violence prevention, tutoring, parent education and family support. Alexandria County, Virginia 4-H reported that 60 youth participated in an after-school homework center to assist youth in at-risk communities with homework completions, behavior modification and skill development. Students participating have improved their grades by 30%. parents and teachers have reported that the center has improved behavior that is a carryover in the class and home and the program provides a safe environment for the child.

Through Virginia Cooperative Extension, eighty-five percent of the participants (43) in the Virginia Certified Planning Commissioners program reported that their knowledge of planning principles and practices improved as a result of participating in the 10-week program.

Promoting Business Programs

Through Virginia Cooperative Extension educational programs, 995 Virginia loggers have completed 23,880 contact hours of comprehensive educational programs in logging safety, sustainable forestry/business management, and harvest planning best management practices during the period 1995-1999. On-site post training evaluations conducted in 1998-99 found that 86 percent of the participants improved their operation in one or more specific ways as a direct result of the training they received.

Promoting Housing Programs

Through Virginia Cooperative Extension, nearly 1,200 (1,188) participants of Home and Housing Education statewide increased their knowledge of choosing safe, affordable housing, and preventative home maintenance. Eighty-two percent of participants practiced home repair management skills, which resulted in approximate net savings of $60.00 per month per household in repair costs (total estimated savings of over $700,000).

In Franklin County, Virginia, 95% (75 of 79) of the Community Development Block Grant (CDBG) rehabilitation homeowners stated that they learned and adopted at least three home maintenance or money management skills, one each from the three sessions that they were taught. Eighty five percent (67 of 79) of the program participants were first time participants in Virginia Cooperative Extension-sponsored programs.

Through Virginia Cooperative Extension, one hundred people successfully completed the Home Ownership class, with 61 buying a home within the year. Another 25 persons bought homes as a result of participating in regional housing conferences.

Supplemental Income Strategies

Virginia Cooperative Extension Agents estimated crop damage and assisted county boards of supervisors throughout the Commonwealth in the drafting of county resolutions for disaster area declarations as a consequence of one of the worst droughts in the history of the State and Hurricanes Floyd and Irene. Agents worked with grain and livestock producers to increase producer awareness of government relief programs offered through the Farm Service Agency, the Natural Resources and Conservation Service, and the Crop Insurance Agency.

In cooperation with the local milk cooperative and an agricultural lender, Virginia Cooperative Extension conducted the Dairy Financial Planning Seminar for over 100 Shenandoah Valley dairy farm families receiving large cash payments from the sale of

their local milk marketing cooperative. As a result, producers were able to make more profitable investment, expansion, and retirement decisions.

A dairy marketing club was organized in Washington County, Virginia, to educate dairy producers about commodity futures contracts and to evaluate milk-marketing alternatives. Educational meetings were conducted using a futures market trading simulator on the internet from the University of Illinois called TRADSIM. A second project of the club was to evaluate the feasibility of marketing milk locally through the establishment of a cheese retail market.

Over 100 Farmers Participated In A Virginia Cooperative Extension Educational Program Conducted In Southside Virginia On The Potential Profitability Of Using Tobacco Transplant Greenhouses For Supplemental Crops

As a result of Virginia Cooperative Extension educational programs, 54 producers committed to growing 242 acres of vegetables for the Clinch Mountain Farmers' Market. In 1999, over $220,000 in vegetable sales were generated, which was three times more than projected for the season.

Workforce Preparation – Youth and Adult
Of the 202 Incentive for Employment not Welfare (VIEW) participants involved in Virginia Cooperative Extension-delivered "work-readiness" training, 106.5 (52.5%) were able to gain employment in the Social Work/Family Services occupation.

Youth Developmnent/4-H
During the reporting year, Virginia 4-H programs reached 469,321 youth through schools and clubs. Of these, 128,243 were enrolled as 4-H members. Through a vast number of volunteers numbering 44,153, 4-H program efforts were supported and sustained. Volunteer commitment of these 4-H volunteers resulted in over 1,218,016 hours of volunteer time, thus saving county and state government approximately $18,270,240 in funding.

Some 13,000 youth were involved in career exploration, entrepreneurs, and high school financial planning educational programs throughout the state. Surry County, Virginia 4-H reported that 24 students (grades 3-6) increased their knowledge by an average of 20% on economic principles through the Mini-Society, entrepreneur program. These youth reported that through hands on activities, they understood terms, definitions, and governmental practices.

Comprehensive programs focus on character and leadership development, violence prevention, tutoring, parent education and family support. Alexandria County, Virginia 4-H reported that 60 youth participated in an after-school homework center to assist youth in at-risk communities with homework completions, behavior modification and skill development. Students participating have improved their grades by 30%. parents and

teachers have reported that the center has improved behavior that is a carryover in the class and home and the program provides a safe environment for the child.

The Virginia Adolescent Resiliency Assessment (VARA) was administered to 1,045 high school students, grades 8-12, in two rural counties. The data gathered is being utilized to provide direction to collaborative program planning involving multiple agencies, organizations, parents and youth to meet identified needs. It is also serving as “up-to-date” information upon which to base grant proposals. One Community Collaboration grant proposal has already been approved in the amount of $5,000 from the Alcoholic Beverage Control Board.

According to exit interviews, participants in the “Challenges of Adolescence” program conducted by Virginia Cooperative Extension evidenced an 18% gain in knowledge related to youth development. Over 1500 participants gained knowledge regarding resources to enhance family stability.

Through Virginia Cooperative Extension, ninety-three percent (93%) of 72 participants attending training sessions on "Creative Activities for School Age Children" and "Guiding the Behavior of Infants and Toddlers" reported gaining helpful information for use in their care of children. The sessions also provided 6 hours of continuing education credit for child care provider licensing.

4-H Animal Sciences: Over 36,000 youth participated in various 4-H educational programs related to the animal sciences. These programs focused on the care, fiscal responsibility, management 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. A new approach to reaching and involving youth in learning opportunities with animal sciences involving technology was developed during this reporting year. Known as the 4-H Virtual Farm, animal sciences focus included sites dealing with beef, dairy, poultry, and aquaculture. During the 2000 Virginia State Fair, over 25,000 youth were involved in hands-on learning stations dealing with these subject matter areas. Among all animal science projects, the 4-H Embryology project, which supports classroom learning around the Virginia Standards of Learning (SOL’s), was the most popular with nearly 14,000 youth involved. In the Alexandria unit, 450 4th and 5th graders developed awareness in developmental and growth stages experience. One teacher stated that this program is an in-depth and truly wonderful way for "urban" children to experience caring for the total needs of animals.

4-H Communications: Approximately 24,000 youth, working closely with adult assistance, were actively involved in communication skills development 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. Brunswick 4-H reported 38% (124 out of 203) in-school 4-H club members completed SOL 5.3, "The students will make a planned oral presentation." Agent and teachers conducted training on how to do an oral presentation and students did

their presentations during in-school 4-H club meetings. Seventeen competed in the 4-H County Presentation Contest and five went onto the district contest. One senior member competed at the State 4-H Congress with his powerpoint presentation.

4-H Science And Technology: As Previously Mentioned In The Animal Sciences Section Of This Report, The Virginia 4-H Virtual Farm Production Is An Example Of Utilizing Technology To Enhance Learning Opportunities For Youth. Approximately 48,000 Youth Were Involved In Science And Technology Projects And Activities, Affording Them Greater Opportunities For Learning And Application Of Knowledge.

The Virginia 4-H Tech Corps continued to develop real-life projects in teaching others in the use of technology-based resources, and greater utilization of technology in program support and delivery was emphasized. This resulted in further development of the interactive 4-H web site which features learning opportunities for youth and adults. Amherst 4-H, after completing a weekend camping experience focusing on Science and Technology, reported that 80% of campers (79 of 99) reported that their overall knowledge of science in the 10 classes that were taught improved "very much".

4-H Environmental Education and Natural Resources: Over 65,000 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. A new resource, similar to the Virginia 4-H Virtual Farm, was the development of the Clean Water for the Frog, a technology type of learning program for youth. Outdoor and environmental education programs involved thousands of school-aged youth in hands-on, experiential education opportunities related to the Virginia SOL's. Forestry 4-H programs were piloted at three of the six 4-H educational center's summer camping programs, resulting in increased youth awareness and understanding of forestry issues throughout the Commonwealth. Also, water quality programming was emphasized with some 3000 youth participating in water resource related programs that contributed to their knowledge, understanding, and appreciation of water resource issues in Virginia. In Scott County, for example, 986 youth participated in Forestry judging, Enviroscape, Powell River Project, and three outdoor environmental winter camps. Youth showed a 68% knowledge gained in these areas of study, learning about water pollution, environmental issues, and protection of the watershed.

4-H Careers and Economic Education: Food, Nutrition, and Health: Nearly 27,000 youth participated in food, nutrition, and health related projects and programming opportunities. The Virginia 4-H Pyramid Chef continued to be utilized with educators, youth, and 4-H camp participants. Cooking with CHARACTER was utilized with both extension agent and volunteer staff development events during the year, resulting in increased awareness and understanding of food safety and nutrition.

4-H Plant and Soil Sciences: Approximately 14,000 youth engaged in plant and soil sciences programs and projects. For the coming year, the 4-H Junior Master Gardener program will be implemented to involve youth and Master Gardeners in increased knowledge and use of plant and soil sciences. Mecklenburg County, Virginia 4-H reported 60% of 4-H members increased their knowledge of basic plant parts, growth factors, and photosynthesis.

4-H Family and Consumer Sciences Nearly 13,700 youth were involved in family and consumer sciences projects and programs. The Virginia 4-H Strong Families, Competent Kids program, focusing on latchkey youth, continues to involve additional youth in learning survival skills. Participants continue to report increase in knowledge and skills gained through the program.

4-H Citizenship: Some 64,000 youth benefited from citizenship programming activities, knowledge, and events this year. During the 2000 Virginia State 4-H Congress, over 700 youth participated in community service learning projects, resulting in an increased knowledge and appreciation of giving back to the community (.95 rating). Smyth County 4-H reported Over 500 members gained experiences in learning how the county government was established, how it is run, and how county officials are elected. They learned job descriptions of each county office. Many classrooms provided speakers from the county to give overviews of their jobs. The students gained knowledge of functions of local offices, how tax money is spent, and how budgets are handled. Over 45 percent gained experience in Citizenship and Community Service projects such as caring for the elderly, working with young children, providing assistance to needy families, and by interacting with a variety of groups throughout the county.

Virginia 4-H has attained 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 30,395 youth in 373 camping sessions with 4,247 volunteer leaders assisting. Continuing to rank second largest in the nation in terms of number of participants, Virginia's 4-H camping program if fully American Camping Association Accredited, a feat which the first largest camping program has not attained. Three 4-H educational centers (Airfield, Jamestown, and Southwest Virginia) went through re-accreditation during this year and achieved re-accreditation status, the highest recognized camping accreditation available in the nation in terms of safety and program quality. Program impacts included:

- A total of 30,395 participants were involved in 373 camping programs through 4-H.
- 7,016 participants were involved in 131 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.
- 5931 adult and teen volunteers were involved in staff development opportunities in camp counseling and and assisted with the 4-H camping and special interest programs.
- These volunteers contributed a total of 435,196 hours to the 4-H program.

- 92% of 4-H campers reported that they gained leadership skills through 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 results are making great impacts as evidenced by some of the following highlights:

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	141.5	7.0	0.0	8.9	12.0	0.0
2002	141.5	7.0	0.0	8.9	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

B. 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 which 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

Virginia Cooperative Extension has a state leadership council (VCELC), one hundred and three local leadership councils (ELC's), and program leadership councils for 4-H, family and consumer science, and agriculture and natural resources. Over 1,200 citizens are members of the ELC's. A mechanism is in place that facilitates the VCELC's connections with local ELC's and other appropriate stakeholders. VCE requires that all extension leadership councils represent the diversity of the population served. In this way, widespread stakeholder input can be received in an open and fair manner.

The local ELC's function as a partner with the local Extension unit to assist in: 1) planning, developing, implementing, evaluating, and reporting on Extension programs that meet local needs; and 2) designing, implementing, and evaluating a marketing and development strategy for the local Extension unit and its programs. The ELC's set program priorities based on identified community needs. The total number of ELC's

increased from ninety-five to one hundred and three during the past year. Of the 107 local units 103 or 96% have organized a ELC.

VCELC membership consists of representation from all 22 Virginia planning districts, 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 station, the 1890 director of research, the deans of the related colleges, and the director of governmental relations at Virginia Tech. The VCELC met four times during this reporting period.

VCELC members received the minutes of the meetings of the local ELC's in their planning districts. Likewise, VCELC members communicated with the chairpersons of the local ELC's on a regular basis to discuss mutual extension concerns.

A primary means in involving a community in developing and maintaining appropriate educational programs is through partnering with Extension Leadership Council (ELC's). Virginia Cooperative Extension values and is committed to this important relationship. As part of that commitment, we believe it is important to assess the status and well being of ELC's through the Commonwealth. During the next year an evaluation of all ELC's will be conducted. As part of the evaluation, survey instruments will be completed by the Extension agent in each unit designated to provide primary leadership for the ELC and the ELC Chair.

Virginia State University Extension Leadership Council

Virginia State University is presently forming an 1890 Extension Leadership Council. The Council membership will consist of statewide representation of clientele, faculty and other professionals in a format composed of three sub-councils. The purpose of the council is to establish open and regular communications between the VSU Division of Agriculture and the Council. The Council will assist the division, extension and research, in program determination, implementation and evaluation. There will be a continuing dialogue between the council and the 1890 Programs. There will be representation on the VCELC from the 1890 ELC.

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 Leadership Council

The Family and Consumer Sciences Leadership Council provides vision for the Virginia Cooperative Extension Family and Consumer Sciences (FCS) program and develops strategies which lead to the fulfillment of that vision. The FCS 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 Extension Family and Consumer Sciences Leadership Council met three times in the past year. Accomplishments included: sponsoring a statewide conference for program collaborators; providing leadership and direction for new program initiatives; creating marketing strategies; and, identifying new program partners. The Council has recently initiated a strategic planning process which will produce a three year plan for the state Family and Consumer Sciences program.

4-H Leadership Council

The 32 member 4-H Leadership Council was formed in 1994. It represents the diversity of the 4-H program and includes all major 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, agents and volunteers. At-large members are also on the Council. At the November 1999 meeting Council members were given a map that showed the location and ethnic diversity of the council body. During the reporting period the Council met five different times. The Council is divided into three active working groups: Policy, Emerging Issues, and Marketing. The Policy Committee reviewed over fifteen (15) 4-H Policies and made recommendations for changes. The Emerging Issues Committee addresses many issues identified by the Council; such as, mid-term review of the Strategic Plan, relationship between the state 4-H program and the 4-H All Stars, Intermediate Age Programming, and relationship with State Fair. The Marketing and Public Relations Committee developed a plan to promote National 4-H Week Events, reviewed and recommended modifications to the "4-H For Life" magazine, and purchased and distributed 4-H promotion items. The Council's activities help shape ~~is~~ an educational program that meets 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.

Annual Public Hearings

The Virginia General Assembly conducts annual public hearings on the proposed state budget on a regional basis. Members of the public are invited to comment on any aspect of the budget, including extension and research budgets. VCE distributed information about the hearings and, along with the local ELC's, encouraged attendance and ~~helps~~

arranged carpooling for attendees. All clientele, including 4-H youth and under-served and under-represented audiences, are encouraged to attend. Several Citizens attended the January hearings on behalf of VCE.

College of Human Resources and Education
Stakeholder input through advisory boards continues to be a major emphasis of the College of Human Resources. In the past year, two additional advisory groups have been added bringing the total to 21. Total citizen members exceed 300 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
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.

College of Agriculture and Life Sciences Leadership Council
The college council membership is composed of over eighty individuals, 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.

In January 2000, the Council's Research Committee studied the five main goals as well as the various sub-topics as they related to how the Virginia Agricultural Experiment Station might invest its resources. The results were as follows: Research Committee members suggested that VAES could invest 40% of its resources in Goal 1, 15% in Goal 2, 14% in Goal 3, 20% in Goal 4, and 11% in Goal 5. All VAES project PIs reviewed their projects in May 2000 and estimated their project efforts in each of the five Goal areas. The results for 241 projects were as follows: PIs responded that approximately 46% of their project efforts are in Goal 1, 17% in Goal 2, 6% in Goal 3, 22% in Goal 4, and 9% in Goal 5. Comparing these results, VAES noted that the Research Committee suggested a slightly higher level of activity/investment in the Goal 3. Further, examining the sub-goal areas,

the Research Committee put a higher emphasis on value-added plant genes and sustainable crop production systems in Goal 1. For Goal 2, they emphasized food and fiber safety, and for Goal 3 it was food choices for optimum nutrition and prevention and treatment of diet-related diseases. For Goal 4, the Committee emphasized nutrient management for agricultural systems, and for Goal 5, they gave a higher average priority to economic and policy analysis of agricultural industrialization and to rural community development issues. VAES is analyzing these results and expects to engage the State ELC in a similar evaluation of investments during 2001.

A Plan to Serve Virginia Agriculture, Human, and Natural Resources

Virginia Tech completed a major effort in 1996 to devise a comprehensive strategic plan for the University. The College of Agriculture and Life Sciences and the VCE/VAES Division at Virginia Tech form an integral part of that planning process and engaged a public process to develop The Plan to Serve Virginia Agriculture, Human, and Natural Resources. This involved meeting with 20 academic departments in four colleges, 12 off-campus research centers, extension leadership councils which represented 106 city and county extension offices, and dialogue with nearly 90 agricultural and natural resource organizations around the state. Through this planning process, priorities were set for the teaching, research, and extension programs. The Plan was also posted on the college's homepage for review and input.

The strategic planning process that led to the development of The Plan identified critical short-term, intermediate, and long-term agricultural and economic issues which need to be addressed. Among these were several broad categories that depend upon the expertise available through the extension and research division. From these categories, two main objectives for the VCE/VAES Division were formed:

- To develop and disseminate to the citizens up-to-date, research based knowledge in food, nutrition, health, and biotechnology
- To develop and disseminate to the citizens up-to-date research based knowledge in agriculture, forestry, and natural resources.

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 showed in the following table:

Virginia Commodity Boards	No. of Projects	Funds Awarded in 2000
Corn	9	$62,531
Horse	1	$3,000
Peanut	6	$36,433
Small Grains	13	$128,454
Small Grains Association	2	$8,000
Soybean	6	$30,122
Cotton	9	$26,917
Apple	1	$9,222
Cattle	1	$8,400
Flue-Cured Tobacco	8	$43,000
Dark-Fired Tobacco	2	$5,500
Pork	2	$5,700
Winegrowers Advisory	10	$161,570
Total		$528,849

In addition to the commodity board support shown above, the Virginia Agricultural Council funded 15 projects at Virginia Tech in the year 2000 totaling $200,680.

The Sheep, Irish Potato, and Sweet Potato commodity boards did not fund any project in 2000.

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.

C. Program Review Process

Virginia's five-year Plan of Work presented tentative guidelines for reviewing multistate research projects. These guidelines were to be used on four project proposals being incubated at that time at Virginia Tech (VAES) and in partner institutions. Only one of those five proposed projects had been written and reviewed prior to the system's adoption of the *Guidelines for Multistate Research Activities* in September 2000. All subsequent

multistate proposals, including any of the remaining three original multistate proposals, will be reviewed using the September 2000 guidelines.

D. Evaluation of the Success of Multi and Joint Activities

In this first year of the AREEA plan, VCE has focused on documenting multistate Extension activities only. Efforts to evaluate the success of multistate Extension activities will take place in successive years of the plan. VCE's programming process will be the guiding framework for evaluating multistate Extension activities. The VCE programming process consists of three fundamental components that address the four identified multistate evaluation criteria: 1) situation analysis- identifying critical issues of importance through stakeholder involvement that Extension should address, 2) program design and implementation- identifying and implementing appropriate educational programs that address critical issues, including needs of under-served and under-represented populations, through identifying specific outcomes and impacts, and 3) evaluation and reporting-documenting the outcomes and impacts of programs to show improved program effectiveness and/or efficiency. VCE will be developing a protocol to evaluate multi-state Extension activities and reporting outcomes and impacts in 2001.

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)

titution Virginia Polytechnic Institute and State University
te Virginia

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

	Actual Expenditures				
e of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
To achieve an agricultural production system that _	**$296,000**	_____	_____	_____	_____
ghly competitive in the global economy.	_____	_____	_____	_____	_____
To provide a safe and secure food and fiber system.	**14,000**	_____	_____	_____	_____
To achieve a healthier, more well-nourished	**14,000**	_____	_____	_____	_____
ulation.	_____	_____	_____	_____	_____
To achieve greater harmony (balance) between	**149,000**	_____	_____	_____	_____
culture (production activities) and (stewardship and	_____	_____	_____	_____	_____
ection of) environment.	_____	_____	_____	_____	_____
To enhance economic opportunities and the quality	**9,000**	_____	_____	_____	_____
e among families and communities.	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
al	**$482,000**	_____	_____	_____	_____

J. David Barrett — **Director**
2/28/01 — **Date**

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e that the approved target of 7% was attained.

Brief Summaries of Selected Multistate Extension Activities

Virginia Cooperative Extension (VCE) conducts educational programs, exchanges information, and shares training of faculty in specific subject matters with neighboring states. Documentation of multistate Extension activities for 2000 included committee work, regional and national projects, grants, conferences and meetings, and educational programming efforts with 24 different states (Kentucky, North Carolina, South Carolina, Georgia, Maryland, Pennsylvania, Tennessee, Alaska, Delaware, New Jersey, West Virginia, Oregon, Alabama, Florida, California, Iowa, Louisiana, Minnesota, Arizona, Washington, New York, Indiana, Kansas, and Arkansas). The following examples provide selected highlights of Virginia's multistate Extension work.

- An on-going relationship with North Carolina Extension Service (NCES) agents and specialists in Christmas Tree production programming including jointly held meetings, field days and research trials; project planning with NCES for New River-National Heritage River programs; joint training with NCES for the Community Voices Leadership Program (Kellogg Foundation); beef and dairy production and marketing meetings involving farmers from Virginia and North Carolina.
- Specialists and agents from Virginia, North Carolina, and West Virginia are developing a new multidisciplinary 4-H curriculum dealing with resources of the New River Watershed.
- Joint program delivery with Tennessee Cooperative Extension Service (TCES) on 4-H environmental education; tobacco production; the development of the Agriculture Show in Kingsport, Tennessee, which includes educational programs, displays, and trade shows; and a conference on Home-Based Businesses, Bed and Breakfast Inns in the Cumberland Gap area.
- Joint educational programs in beef and forages with Kentucky agents and specialists.
- Agricultural tours of Virginia farms for agents from neighboring states.
- Strawberry, blueberry and asparagus production and marketing educational programs conducted jointly with Maryland and West Virginia.
- Joint teaching of educational programs on Urban Nutrient Management with Maryland, North Carolina and Washington, DC.
- Virginia and Maryland are merging current programs in family finance education to increase volunteer involvement in program delivery and support.
- Joint effort with Maryland, Pennsylvania and Washington, DC to implement integrated past management on 75% of agricultural land in the Chesapeake Bay basin.
- Program to train food bank personnel in Washington, DC; Virginia includes limited income children from Washington in the 4-H "Kids' Café" camp.
- Child-care programs conducted jointly by Virginia and West Virginia resulted in 79% of the participants reporting adoption of improved health and safety procedures. The Virginia/West Virginia Advisory Council (VAWVAC) won three team awards including the National Extension Association of Family and Consumer Sciences Florence Hall Award.

- Virginia and North Carolina work together on the Southeast Beef Veterinary Consortium.
- Conducted an orientation for agents and specialists in Virginia, Pennsylvania, Kentucky and Iowa on Virginia's newly developed draft system to establish price and purchase/grow silage on contract.
- Conducted a multi-state beef cattle marketing seminar with participants from West Virginia, Virginia, Maryland and Pennsylvania.
- Conducted a bull test and feeding trial with owners from both Virginia and West Virginia.
- Virginia is assisting Maryland by temporarily covering Maryland's beef and dairy veterinary work until a vacancy at Maryland can be filled.
- Virginia participated in a multi-state regional Food Safety project to study emerging pathogens and their relationship to food processing practices.
- A Virginia equipment dealers association program was conducted in conjunction with representatives from Maryland, North Carolina, South Carolina, Delaware, and West Virginia.
- Extension staff from Virginia, Georgia, South Carolina, North Carolina, and Arkansas conducted a program on cotton response to boron and nitrogen fertilization.
- Extension staff from Virginia, North Carolina, Florida, Louisiana, California, and Alaska conducted a program on sanitary control procedures for fish.

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

	Actual Expenditures				
e of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
To achieve an agricultural production system that					
ghly competitive in the global economy.	**$187,000**				
To provide a safe and secure food and fiber system.	**40,000**				
To achieve a healthier, more well-nourished					
ulation.	**10,000**				
To achieve greater harmony (balance) between					
culture (production activities) and (stewardship and					
ection of) environment.	**30,000**				
To enhance economic opportunities and the quality					
e among families and communities.	**34,000**				
al	**$301,000**				

J. David Barrett **2/28/01**
Director **Date**

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e that the approved target of 10% was attained.

Brief Summaries of Integrated Activities (Hatch Act Funds)

The Virginia Agricultural Experiment Station maintains a diverse portfolio of regional projects involving multiple institutions, disciplines, states, and regions. Most of these programs are listed in CRIS. Shown below is the 2000 portfolio of regional research projects where VAES is an active partner.

Project ID	Project Title Participating States/Institutions
NC-119	Management Systems for Improved Decision Making and Profitability of Dairy Herds AL, AZ, CA, FL, GA, IL, IN, IA, KS, MI, MN, MO, NE, NH, NM, NYC, OH, PA, SD, TN, TX, VA, WA, WI
NC-140	Rootstock and Interstem Effects on Pome and Stone Fruit Trees AR, CA, CO, GA, IL, IN, IA, KS, KY, MA, MD, ME, MI, MN, MO, NC, NJ, NYG, OH, OR, PA, SC, SD, TN, UT, VA, VT, WA, WI, WV
NC-168	Advanced Technologies for the Genetic Improvement of Poultry AL, AR, CA, CANADA, DE, IL, IA, MD, MA, MI, MN, NC, OH, IN, VA, WI, USDA/ARS
NC-208	Impact Analysis and Decision Strategies for Agricultural Research AL, CA, FL, GA-ATHENS, ID, IA, LA, MI, MN, MO, MT, NE, NJ, YC, TX, VA, WI, ERS/USDA
NC-209	Genetic Improvement of Dairy Cattle Using Molecular Genetic Information AZ, CA, IL, IA, MA, MI, MN, OH, SD, USDA/ARS, VA, WI
NC-220	Integration of Quantitative and Molecular Technologies for Genetic Improvement of Pigs AL, GA, IN, IA, MI, NE, NC, NC, OH, OK, VA, USDA/ARS
NC-226	Development of Pest Management Strategies for Forage Alfalfa Persistence IL, IN, KY, MD, MI, MN, MO, NE, NY, OH, OK, PA, SD, VA, WI, WY
NE-112	Mastitis Resistance to Enhance Dairy Food Safety CA, CTS, IL, IN, IA, KS, KY, LA, MI, NYC, OH, PA, TN, VT, VA, WA, USDA/ARS

NE-162 Rural Economic Development: Alternatives in the New Competitive Environment
AZ, CA, DE, GA, IN, KY, MI, MN, MO, NV, NYC, NH, NC, OH, OR, PA, RI, SC, UT, TX, VA, WA, WI, USDA/ERS/ED

NE-165 Private Strategies, Public Policies, and Food System Performance
AR, CA, CTS, FL, GA, IL, IN, IA, KS, LA, MD, MA, MI, MN, MT, NE, NH, NJ, NYC, NC, OH, RI, TX, VA, WI, USDA/ERS, USDA/RBS, SDA/AMS, USDA/PSA, CDCP, FDA, GAO

NE-176 Characterization and Mechanisms of Plant Responses to Ozone in the Northeastern U.S.
AL, MD, MA, MN, NJ, NYC, PA, TX, VA, BIT, USEPA, USDA-ARS

NE-183 Multidisciplinary Evaluation of New Apple Cultivars
AR, CTH, GA, MA, ME, MI, MO, NC, NH, NJ, NYC, NYG, OH, OR, PA, VA, VT, WA, WI, WV, PA/RODALE, WV(USDA), CANADA

NE-184 Development of New Potato Clones for Environmental and Economic Sustainability in the Northeast
DE, FL (Hastings), ME, NV, NJ, NYC, NC, OH, PA, PEI, Quebec, VA, WV, USDA/ARS/BARC

NE-186 Genetic Maps of Aquaculture Species
CT, ME, NH, NJ, AL, LA, VA, CA, WA, DE, HI, LA (Xavier), MA (Tufts U.), MA (Worcester Polyt.), USDA/ARS, USM Coast Res. Lab., MO, NC, West Carolina U., Phil. Col. of Pharm, RI, URI Milwaukee, VA (Wm. & Mary), TX (Houston), Inst. Aquaculture, U. Col. Swansea, Keio U. School of Med.

S-009 Plant Genetic Resources Conservation and Utilization
AL, AR, FL, GA, HI, KY, LA, MS, NC, OK, PR, SC, TN, TX, VA

S-263 Enhancing Food Safety Through Control of Foodborne Disease Agents
AL, AR, GA, IA, KY, LA, MI, MN, MS, NE, NC, SC, TX, VA

S-270 Utilizing Potassium Buffering Capacity to Predict Cotton Yield Response to Potassium Fertilizer Models
AL, AZ, AR, CA (Davis), FL, GA, LA, MS, NM, NC, TN, TX, VA

S-271 Solid Phase Extraction Techniques for Pesticides in Water Samples

AR, FL, GA, MS, NC, PR, SC, TX, VA, USDA-ARS

S-273 Development and Application of Comprehensive Agricultural Ecosystems Models. AL, FL, GA, IL, IA, KY, LA, MD, MN, NCSU, OH, OK, TN, TX, VA, NC, USDA-ARS

S-275 Animal Manure and Waste Utilization, Treatment, and Nuisance Avoidance for a Sustainable Agriculture
AL, CA, FL, GA, HI, IL, IN, IA, KY, LA, MN, MI, NC, OR, SC, TN, TX, VA, WI, USDA-ARS

S-278 Food Demand, Nutrition, and Consumer Behavior
CA, FL, GA, IL, IN, IA, KS, LA, ME, MN, NV, NJ, NYC, NC, OH, OR, SC, TN, TX,VA, WA, WI, U. OF NC, USDA/ARS, USDA/CNPP, USDA/ERS, USDA/FCS, US/BLS, IL, IN, IA, KY, LA, MN, MI, NC, OR, SC, TN, TX, VA, WI, USDA-ARS

S-280 Mineralogical Controls on Colloid Dispersion and Solid-Phase Speciation Of Soil Contaminants
AL, FL, GA, KY, LA, MS, NC, OK, PR, SC, TN, TX, VA, USDA/NSSL, DOE

S-281 Dynamic Soybean Insect Management for Emerging Agricultural Technologies and Variable Environments
AR, FL, GA, IL, IN, IA, KY, LA, MS, NE, OH, SC, TN, TX, VA

S-282 Managing Plant-Parasitic Nematodes in Sustainable Agriculture with Emphasis on Crop Resistance
AL, AR, FL, GA, KY, LA, MN, MS, NC, SC, TN, TX, VA, USDA/ARS

S-284 Genetic Enhancement of Health and Survival for Dairy Cattle
IL, IN, IA, LA, MN, NE, NYC, NC, PA, VA, WI, AIPL, U. of Guelph

S-285 Reproductive Performance of Turkeys
AR, CA, MN, NC, OH, OR, SC, VA, WI, USDA/ARS

S-288 Nutritional Systems for Swine to Increase Reproductive Efficiency
AL, AR, FL, GA, KY, LA, MS, MO, NC, OK, SC, TN, TX, VA

S-289 Factors Associated with Genetic and Phenotypic Variation in Poultry: Molecular to Populational
AL, SC, GA, LA, MS, NC, OH, PA, TN, TX, VA

S-295	Enhancing Food Safety through Control of Food-borne Disease Agents AL, AR, IA, KY, MI, MN, MS, NE, NYG, NC, SC, TN, VA
S-298	Assessing Impacts of Welfare Reform on individual, Family and Community Well-Being in the Rural South VA, PR, SC, LA, FL, MS, KY; FLX, S. E. Louisiana Southern Rural Dev. Ctr.
S-301	Development, Evaluation and Safety of Entomopathogens for Control of Arthropod Pests AL, AR, AZ, CA, CTH, FL, GA, ID, IL, KY, LA, ME, MS, MN, NJ, NYC, NC, OH, SC, TN, TX, VA, USDA/ARS, USDA/FS
S-303	Biological Control of Arthropod Pests and Weeds AL, AR, FL, GA, KY, LA, NC, OK, SC, TN, TX, VA, ARS/USDA, FLX, FL Div. of Plant Industry, FL Dept. of Agr., NC Dept. of Agr., USDA/APHIS, US Army Corps of Engineers
W-102	Control of Animal Parasites in Sustainable Agricultural Systems CA, GA, IL, KS, LA, MN, MO, MS, MT, UT, TX, VA, WA, USDA/ARS
W-128	Microirrigation Technologies for Protection of Natural Resources and Optimum Production ARS, AZ, CA, CO, GA, HI, IA, KS, MI, NM, OR, TX, VA, WA, WY
W-168	Seed Biology, Technology, and Ecology AR, AZ, CA, FL, IA, KS, KY, LA, MT, NYG, NYC, NC, OH, OR, UT(Brigham Young U), VA, WA, WI, USDA/ARS, USDA/FS
W-170	Chemistry and Bioavailability of Waste Constituents in Soils AR, CO, CA, FL, GU, HI, IN, IA, KS, OK, MI, OR, PA, TX, VA, WA, WY, USDA/ARS, US ARMY, MWRDGC, N-VIRO,Proctor & Gamble, TX Tech
W-177	Enhancing the Global Competitiveness of U.S. Red Meat AZ, CA, CO, ID, IA, KS, NE, NV, NM, OK,SD, TX, UT, VA, WA, WY, USDA/ARS, USDA/ERS
W-181	Modifying Milk Fat Composition for Enhanced Manufacturing Qualities and Consumer Acceptability CA, ID, IL, NYC, OH, SC, SD, UT, VA, IA

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)

titution Virginia Polytechnic Institute and State University
te Virginia

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

	Actual Expenditures				
e of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
To achieve an agricultural production system that _	**$390,000**				
ghly competitive in the global economy.					
To provide a safe and secure food and fiber system.	**50,000**				
To achieve a healthier, more well-nourished					
ulation.	**17,000**				
To achieve greater harmony (balance) between					
culture (production activities) and (stewardship and					
ection of) environment.	**142,000**				
To enhance economic opportunities and the quality					
e among families and communities.	**90,000**				
al	**$689,000**				

J. David Barrett
Director

2/28/01
Date

m CSREES-REPT (2/00)

e that the approved target of 10% was attained

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

A snapshot of the VAES research project portfolio for 241 projects in 2000 revealed that 144 projects (60%) had some level of integration between research and extension activities. This integrated is expected because many of the VAES researchers hold joint appointments with VCE. It is often difficult to separate research and extension along the full continuum of activities from first discovery to final technology transfer.

In 2000, the integrated activities occurred across all five goal areas as follows:

Goal Area	Percent of integrated projects by Goal
1. Agricultural competitiveness	46
2. Safe and secure food/fiber	18
3. Healthier well-nourished population	4
4. Agriculture and the environment	22
5. Econ. opportunities, QOL	10

Civil Rights

Virginia Cooperative Extension (VCE) is an educational outreach program of Virginia's land grant universities, Virginia Tech and Virginia State. It's mission is to enable people to improve their lives through an educational process that uses scientific knowledge focused on issues and needs. VCE continues to demonstrate a strong commitment to the enhancement of equal opportunity and diversity in employment, programs, and collaborative efforts with volunteers and stakeholders. To continue building upon this commitment, strategies have been determined, implemented, and evaluated 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.

Faced with the reality of ongoing retirements and other attrition, it has become imperative that VCE move forward with an evolving plan to identify qualified individuals, especially minorities, to fill vacancies as they occur. The projected vacancies have also presented an opportunity to step up efforts to diversify the VCE workforce. 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.

An administrative personnel change initiated by the Director created the position of Assistant to the Director with a specific responsibility of providing leadership for VCE's faculty recruitment, diversity, and equal opportunity programs for employees and program participants.

VCE and the Virginia Tech Offices of Multicultural Affairs and Alumni Relations partner to support the position of Coordinator of Outreach and Community Relations. A responsibility of the position is to identify and utilize state and national networks to assist in recruiting and retaining qualified minority Extension faculty and staff that reflect the diverse population of the Commonwealth.

To the extent that educational assistance is an attractive recruiting tool, VCE has instituted 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 provides 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 the members have taken 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
For over thirty years, VCE has operated as a joint program of Virginia State and Virginia Tech. While each university has its particular program strengths, program delivery at the local level constitutes a unified approach. The strength behind 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 and development and delivery of educational programs. ELCs are required to have members who represent the diversity in the communities served. VCE refuses to provide programs to or to 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 at the local level 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 includes specific components identifying an underserved audience and strategies for reaching this targeted group. During the annual evaluation meeting at the end of the performance period, 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 that significant efforts be made to notify 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 large minority membership to promote programs and employment
- Position descriptions for all extension agent positions have been updated to 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." On an on-going basis, department heads and district directors review compliance progress with individual faculty conducting research and extension programs.

To continue building upon existing training efforts, VCE has developed a non-traditional comprehensive internal civil rights review process designed to educate and train paid and unpaid staff in areas related to program outreach, 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 additional agents to participate in the experience, and presents the benefits of the experience with coworkers in his or her unit office. This was determined to be an effective method for exposing a greater number of units to the process.

Civil Rights Compliance Unit Review information is located on a system-wide Intranet site which can be accessed and used as a reference by staff from the unit to be reviewed, agents on the review team, and the district director. Information on the site includes Civil Rights Terms and Definitions, the Civil Rights Review Guide, the Roles of Team Members, Civil Rights Review Unit Preparation, and the Civil Rights Review Tentative Schedule. This information also serves as a training guide for employees to access at their leisure.

VCE has established a goal of 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 occasionally participate in the review. All areas of the Extension hiring and programming processes are reviewed to determine the extent of employee knowledge and commitment to civil rights policies and diversity. Upon conclusion of each unit review, findings and recommendations are shared with staff in an exit review and in writing. The district director follows up with the unit to implement efforts for correcting any deficiencies.

A Civil Rights Compliance Manual was developed for the off-campus Agricultural Research and Extension Centers (ARECs) and a pilot Civil Rights Compliance Review and training session was held at an AREC. A compliance/training session is scheduled annually at an AREC.