Annual Report of Accomplishments and Results

University of Vermont Extension
and
Vermont Agricultural Experiment Station

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Annual Report of University of Vermont Extension and the Vermont Agricultural Experiment Station

FY2002

A. Overview and Accomplishment Highlights

University of Vermont Extension's mission is to improve the quality of life of Vermonters by bringing the benefits of research and technology to them. University of Vermont Extension faculty and staff interact directly with many diverse audiences, not just in program delivery, but also in learning about and addressing the problems and opportunities affecting Vermonters. More than 100 citizens serve in advisory capacities to ensure that educational programming is targeted and relevant to areas that are important to Vermonters. Working collaboratively with other departments of the University of Vermont, Extension strives to strengthen efforts to ensure that educational resources remain accessible and relevant to the state's citizens. For many Vermonters, Extension is a critical gateway to higher education and timely information, serving as the initial or only contact many individuals have with Vermont's land grant institution. Extension faculty and staff logged over 47 Full Time Equivalents in outreach efforts during FY 2001 using a variety of approaches: 1,616 group presentations and workshops; 6,210 on-site visits; 2,243 in-person office consultations; 12,346 phone consultations; the production of 715 publications and press releases; the development of 172 web page publications; and 237 radio and television appearances. Additionally, 5,683 volunteers from communities throughout Vermont donated 37,459 hours in support of Extension outreach efforts.

Research and Outreach to Improve Agriculture

A primary goal of outreach and research is to assist farmers in improving their profitability and sustainability. The dairy industry represents approximately 80% of Vermont agricultural receipts. The dairy industry in Vermont faced a major economic crisis, as the New England Dairy Compact expired, and milk value regressed to decade-old prices. Vermont Agricultural Experiment Station and University of Vermont Extension, working with state and federal agencies, as well as other organizations, proactively contacted individual farmers throughout the state to offer business and technical assistance, and to information to assist with family communications and labor relations. Since June of 2002, University of Vermont Extension directly contacted more than 600 farms to assess how to best help those in need of education and technical assistance. Several farms directly attribute their ability to stay in business through this crisis to work conducted by University of Vermont Extension and Vermont Agricultural Experiment Station. University of Vermont personnel will continue these efforts into 2003.

University of Vermont Extension professionals provide statewide coordination and operational management guidance to farmers in order to assist them in increasing their profits and sustaining their operations.

University of Vermont Vermont Agricultural Experiment Station and Extension personnel established a group of key industry leaders to meet and discuss timely dairy issues for cooperative action, and to identify a "point of unity" toward which all could work. Already, following just two meetings, the dairy industry has been working as a more unified group to confront the issue of milk pricing and the loss of the New England Dairy Compact. They are

also working together to reduce the negative impacts of an increasingly consolidated milk processing business.

It is critical during this period of economic crisis for New England farms that farmers have a clear understanding of how milk pricing, marketing, and policies are constructed. University of Vermont Extension provides milk pricing, marketing, insurance, and policy information to farmers, processors, policymakers, and related people and organizations in the dairy industry. An average of 80% of clients (515) were found to increase their understanding of milk pricing, marketing, and policy information shared through the various media used.

Through University of Vermont's Center for Sustainable Agriculture (CSA), University of Vermont Extension provided training in sustainable Agriculture for northeastern states. Since its inception in 1994, CSA has organized three major sustainable agriculture conferences in New England. Attendance at conferences exceeds 700 people. More than 225 farmers, service providers and university personnel attended CSA-organized farm tours around New England. A regional team-based sustainable agriculture education approach reached 2,344 people at 42 events, produced three resource kits, and established a non-profit marketing institute. In September of 2002, CSA held a professional development conference aimed at enhancing the role of agencies in organic agriculture. Evaluations of farm tours show that 95 percent of 225 participants learned something new about sustainable agriculture. A subprogram, Land Link Vermont (LLVT) connects and relocates farmers who want to farm in Vermont with farmland owners and farming opportunities. Additionally, LLVT provides information, guidance and support for farm start-ups and intergenerational farm transfers. Four hundred and five farmers and landowners have participated in the matching service over four years. Land Link Vermont has made twelve matches affecting 2,643 acres of farmland.

A new product was developed that will help the dairy industry to compete with other beverages, such as soy beverages. Milk can be more functional by fortifying some nutrients (vitamins) and soluble fiber. Research was conducted to formulate milk based nutritional beverages containing multivitamins, minerals, and prebiotics such as inulin and oligofructose. Vermont Agricultural Experiment Station personnel are continuing to work on this project to develop flavored beverages based on this formulation.

In order to limit negative economic impacts on already struggling dairy farms while ensuring farmers reduce the negative impacts of farming on water quality through phosphorus use management, a study was conducted to determine how farmers can reduce phosphorus at the least cost. Analyses show that farmers can conduct the least cost combination of management practices and achieve an eight percent (8%) reduction in phosphorus levels for Lake Champlain, and that achieving a greater reduction will have significantly greater costs to dairy farmers.

Another research and outreach goal is to protect agricultural production from damaging pests, while developing environmentally sound management practices and high quality products. Mastitis is still the most costly disease to the Vermont dairy industry, affecting an average of 20% of dairy cows, and costing $32 million in production losses annually. Each mastitis event can be translated into an approximate cost of $200 to the farm affected. The necessity for a coordinated effort to study resistance of the dairy cow to mastitis resulted in the design and initiation of a multi-state research project that includes 17 research stations and more than 45 research members. Research efforts include the development of new vaccines to combat mastitis

using novel DNA-based technology. Cows have already demonstrated moderate immune responses to the DNA-based vaccines, and vaccinated animals were able to mount a greater antibody response to an antigen challenge. Another approach to reducing rates of mastitis infections is to generate transgenic dairy cows with enhanced resistance to microbial infection of the mammary gland. Vermont Agricultural Experiment Station researchers have recently generated transgenic mice that contain the bacterial gene for lysostaphin, a potent staphylolytic enzyme. Researchers are now working to determine whether the gene negatively affects milk production and offspring growth and maturation rates.

Threats to Vermont agriculture also include invading species, such as the armyworm, thrips, and the Asian long-horned beetle. Armyworm infestations caused feed losses to 80% of dairy farms in several state counties. Outreach efforts led to more widespread use of containment practices, as farmers increased the rate at which they trimmed edges and ditches, thereby breaking the path of entry for the army worms, and reducing their impact on over-wintering feed stores.

Research on thrips has been fruitful for maple syrup growers and horticulturalists, who bring $600 million per year, combined, to Vermonters in value-added sales receipts, farm gate sales, and tourists coming to Vermont to see fall maple foliage. Researchers discovered a major insect-killing fungus that reduces pear thrips populations, developed an inexpensive, "grower friendly" means of producing various strains of the entomopathogenic fungi for growers, tested spraying options to reduce thrips populations in greenhouses, developed a rapid method of estimating over wintering populations of forest thrips, and measured the cold-hardiness of thrips for greenhouse growers. This information is now being disseminated to maple syrup and greenhouse growers in attempts to change management practices to reduce losses due to thrips populations.

Research and Outreach to Improve Natural Resources and Environment

Water quality is one area of concern for Vermont residents. Results from research indicate that lower P content dairy feeds, field buffers, and the utilization of nutrient management consultants represent a low-cost option for reducing the negative impacts dairy farming has on unwanted content in waterways. A multistate project involving ten communities along the Connecticut River is designed to improve water quality while balancing the needs of residents in communities sharing borders with the river. One important outcome of these efforts is the agreement of the communities to develop a Water Quality Consortium for the river valley, with the goal of outlining educational activities that will bring Vermont and New Hampshire residents together to consider ways to protect the Connecticut River.

Research and outreach have been combined to develop a phosphorus index (P-index) for Vermont soils, a model to assist farmers in determining the likely phosphorus levels reaching waterways adjacent to their properties, and educational opportunities to help farmers develop economically feasible methods for reducing phosphorus loads and runoff from their fields. Three dairy farmers in northeastern Vermont implemented changes in corn crop management practices to include an inter-seeding practice, recommended through nutrient management plan consultations. All saw returns to higher productivity this year using this method, which improves soil properties without the addition of fertilizers or nutrients. One farmer who implemented a set of recommendations realized a $4,000 gain for efforts to reduce phosphorus runoff.

In conjunction with University of Vermont's School of Natural Resources and the Lake Champlain Sea Grant, University of Vermont Extension developed the Watershed Alliance to provide schools and educational youth organizations with the necessary tools to implement a watershed ecology curriculum. The expertise, curricula, physical watershed models, water quality testing equipment, and technical support provided over the past three years, have made it possible for 12 schools and 1,260 students to learn and collect consistent, accurate data on six of 17 major Vermont watersheds, learn about their impact on watersheds, and learn ways to become part of the solution to improve water quality in their local areas. Students presenting data to state officials led to a decision to boil drinking water in one town during a period when high bacteria levels were noted. Student data also led to improvements in a wastewater treatment plant in another town.

Integrated Pest Management programs aimed at apple, greenhouse, and vegetable growers reached more than 2,500 growers last year, with at least 50% of those attending face-to-face programs (more than 600 people) reporting that at least one IPM practice learned from the workshops was being employed. Another finding was that 100% of survey respondents of apple IPM educational programs said they employed IPM information in their orchards, with 67% saying they frequently or almost always used the information. Additionally, 97% of respondents reported a reduction in pesticide use through information gleaned from the programs.

Research and Outreach to Improve Health and Food Safety for Vermonters

Research from Vermont Agricultural Experiment Station created national interest when a study showed that sweetened dairy foods and presweetened cereals had a positive association on measures of diet quality, while sugar-sweetened beverages, sugars and sweets, and sweetened grains had a negative association. Results indicate that children should moderate their intakes of added sugars, while selecting foods and beverages that enhance their diet quality. Another study found that children who consume flavored milk have higher total milk intakes, calcium intakes, and similar added sugar intakes when compared with children who do not drink flavored milks. Children who drink flavored milk also consume fewer soft drinks and fruit drinks. The results indicate that flavored milks can provide children with a nutritious beverage and reduce the ingestion of "empty-calorie" drinks. Other research showed that childhood milk consumption had a strong positive correlation to maternal milk consumption.

Nutritional programs offered to low-income adults and children around the State emphasized development of safe and nutritious shopping, cooking, and eating habits, and show remarkable success in changing awareness, attitudes, knowledge, skills, and behaviors. The Senior Farm Share program illustrates one example. During the summer of 2002, the Senior Farm Share program linked approximately 160 Vermont seniors living in subsidized housing to local Community Supported Agriculture farms (farms with community connections as a goal) in their communities. Seniors living in subsidized housing were targeted to participate in this program. Seventy percent said they were better able to eat balanced meals more regularly, and 56% said they worried less about whether food would run out before getting money for more.

Research and Outreach to Improve Economic Development for Vermonters

The specialty foods industry is a growing sector that creates economic development in rural and urban communities. Farm-based and small-scale processors can have a significant segment of the

market if effective, comprehensive support is provided for the development and commercialization of value-added foods. Because of the large number of issues involved with the introduction of new products into the marketplace, farmers and entrepreneurs need expert advice and training regarding federal and state regulations, food safety, food processing and packaging, business development, and marketing strategies. The Center for Food Science at the University of Vermont and Cornell's New York State Food Venture Center joined as partners to create the Northeast Center for Food Entrepreneurship (NECFE), which began operations in 2000. The center's mission is to provide comprehensive assistance to beginning and established food entrepreneurs to promote sustainable economic development in rural communities. The center offers a comprehensive set of research and development opportunities, educational programs, and services, covering the following areas: business and product process development; product safety; product and process technology transfer; and product marketing. In 2002, 24 workshops offered in the Northeast reached 768 people. Combined with other services provided, the center reached more than 1,900 prospective or current food business entrepreneurs. Based on survey responses, those assisted reported skills gains in product safety/sanitation (32%), labeling/packaging (29%), regulatory information (22%), and networking (20%). Major changes in client attitudes included increased self-confidence (32%) and more business savvy (16%). As a result of the center's facilitation, 183 entrepreneurs are now able to produce and market 685 safe products, which represents significant economic activity at the community level.

Another outreach goal is to assist resource-based industries to maintain or improve their viability while developing environmentally sound management practices. To this end, Extension has been able to assist more than 10% of Vermont lumber manufacturing businesses through workshops developed and presented. The forest products industry ranks second in economic importance to Vermont, with approximately $1.5 billion in shipments annually. As a result of outreach efforts, at least 4 owners of small sawmills and one forest landowner have adopted kiln drying methods for their wood which has increased the value of their wood by 75 percent, and doubled their wood market sales. This translated into an average of 50% increase in gross revenues, which permitted the additional employment of five people. These changes have contributed to increasing community tax revenues, and business-related offshoots, as local wood craftspersons are now able to purchase a supply of kiln-dried wood in their communities. Five forest landowners experienced an average 30% increase in their timber market volume, which allowed the landowners to increase the volume of forest management treatment, encouraging increased forest sustainability.

A research emphasis has been on the impact of tourism to the State, and the conditions anticipated by tourists. Last year's study about the impact of farmlands on Vermont tourism was expanded to look at the total impact of tourism to the State. Vermont tourism impacts the state by approximately $4.07 billion annually. Between March 1999 and March 2000 U.S. tourists made 3.84 million visits to Vermont, with an average party size of 3.2 people, equivalent to 12.25 million person-trips. U.S. tourists spent $2.58 billion in Vermont during this period. Economic development groups seek to better understand the structure of the Vermont tourism industry, in order to appropriately market plans for Vermont business and products. A Vermont Agricultural Experiment Station study highlighted the demographics of tourist demand, providing a framework for estimating variables influencing tourism demand, and elasticities for each variable relating to number of visits, as well as the ability to forecast the number of visits.

Research and Outreach to Improve Community Development for Vermonters

Vermont does not have active county governments. Therefore, the quality of communication between town and state officers and representatives becomes a critical factor in developing and implementing sound policies responsive to Vermont residents. Several programs offered through Extension address the needs of town and municipal officers. Town Officers Educational Conferences (TOEC) are offered in five sites around the state on Town Meeting Day and offer an introductory course for newly elected and appointed officials, focusing on the impact of new laws and policies on their jobs, as well as leadership skills, time management skills, and strategies for dealing with the public. Municipal Officers Management Seminars (MOMS) are offered each Fall at four sites around the state, and provide more advanced policy and management skills education for officials, focusing on working with the public and state agencies to accomplish goals. Nearly all Vermont towns face scarce resources, yet this past year more than 800 town and municipal officers were sent (at $35 per person) to one or more meetings, representing eighty percent of Vermont communities. Sixty-eight percent of participants reported they received necessary information to improve their job performance, while 59% reported they will use information learned "fairly frequently" or more frequently.

Many rural areas face economic and community development issues having a very different character than communities whose needs are mainly defined by poverty. Often, the defining features are geographic isolation of communities separated by long distances, absence of large metropolitan centers, low-density settlement patterns, historic dependence on agriculture, continued population loss, out-migration, and economic upheaval or economic distress. The three counties of the northeastern corner of Vermont comprise Vermont's Northeast Kingdom, a term coined by the late Senator George Aiken to identify a region which has long challenged policy makers because of its seemingly endemic poverty, chronic underemployment, and traditional, independent, Yankee rural character. Regardless of the role of rural culture, quantitative social and economic indicators consistently substantiate the status of the Northeast Kingdom (NEK) as the area of Vermont most in need of social program assistance. Unemployment in the region typically runs between 50 and 100% of state averages, home value is half of the state average, and per capita income stands at 75 to 80% of the state average. The percent of the population below poverty level for all three counties is between twelve and fourteen percent, with several towns showing as high as 22% of the population living below the poverty level. The Northeast Kingdom is designated as a Rural Economic Action Partnership (REAP) Zone by the USDA (November 2000). Programs such as Vermont Extension's Northeast Kingdom (NEK) Collaborative have leveraged more than $13 million in grants and loans supporting economic and community development projects in REAP-designated Vermont communities. Additionally, more than $320,000 in in-kind donations and financial contributions have been raised in support of community-based improvements. Youth participation rates in community activities benefit from spin-off programs. Youth-oriented programs are based on long-term, sequential learning models that emphasize a combination of creative educational, recreational and experiential approaches to improve life, community awareness, and community involvement skills. To date, 69% of 3,732 youth participants indicate that they have made at least one positive behavioral change as a result of program involvement. Follow-up of a smaller sample shows that 33 participants made significant gains in competency-related areas including social skills, assertiveness, tolerance, and managing frustration. Combined with youth 4-H programs, these projects engage many community members, as more than 2,000 adults volunteered over 90,000 hours (a volunteer value of nearly $1 million) in support of community-based programs.

Other programs focusing on community youth needs included a High School Financial Planning program that helped 790 students gain basic knowledge about personal financial planning. Results show that 37% of program graduates demonstrated improved expense-tracking skills, 45% began saving money, or increased the amount of money they saved, and 38% had greater confidence in their ability to manage money effectively. A plan to reach more youth involved the use of Vermont Interactive Television at 11 sites across Vermont. After attending the session, 40 educators, representing 1,397 teenage students, requested the program for their classrooms. Also, the 599 participants of a University of Vermont Extension developed parenting program for divorcing parents, now mandated by the State, conducted over 36 workshops around Vermont. Responses were overwhelmingly supportive of the four-hour workshop. The participants indicated that the workshop provided them with new information, skills, and confidence to improve interactions with their children during their period of separation or divorce. A Babysitting Safety program teaching teenagers the behaviors and skills required to become competent babysitters and has provided northern Vermont counties with more than 350 certified babysitters. At least 82 students who completed the course and responded to a survey this year reported that they were better able to market their skills after participating in the program. Vermont Farm Youth Corps (VFYC) is a program designed to increase agricultural work skills for young Vermonters (ages 16 to 21), focusing on intergenerational learning between current agricultural professionals and their enthusiastic VFYC apprentices. Of the 55 Vermonters completing the program this year, 21 graduates were asked by their employers to continue employment part time while they completed educational goals, and all 55 participants gained insight and knowledge of issues facing Vermont agriculture.

University of Vermont Extension and Vermont Agricultural Experiment Station focus on youth as part of efforts to improve environmental quality, with an emphasis on water quality, an environmental issue within the state. Youth are involved in the data collection and analysis segments of research generating data, and are the focus of education and outreach efforts to improve water quality through a program conducted by the Watershed Alliance. Youth participating in the program deliver information gleaned to their communities. The program added three new schools in three new watersheds this past year, so that now, ten of the seventeen watersheds identified for Vermont have data being collected for them. The number of University of Vermont students in the School of Natural Resources that are working with the Watershed Alliance has more than doubled from four in 2001 to eleven in 2002. Results have led to two river clean-ups and one town boiling water for a period of time in response to results obtained from student measures of chemicals and bacteria in the town's water source. The students are presenting information collected by their school to the Vermont Water Resources Board in an attempt to reclassify a little-known wetland, which would increase its protection status.

In FY2002 9,163 youth enrolled in Vermont 4-H programs supported through University of Vermont Extension. Programs targeted youth life skill development through a variety of approaches including club participation, special interest events and day camps, overnight camping experiences, school enrichment programs, school-aged child care programs, and instructional programs. Over 1,270 adult volunteer leaders and 131 youth volunteers contributed more than 31,000 hours to youth life skill development efforts. After State and regional gatherings, where students demonstrate and exhibit their skills, 85% of 4-H youth club participants were reported to have increased knowledge and skills in public speaking or

performing, and 75% of 4-H youth club participants increasingly applied 4-H defined life skills during the year.

Reaching the Underserved

Based on 2000 Census Bureau information, Vermont has a population of 608,827 people, of which 97.1 percent are White, while the average for the United States is 69.1 percent. Other ethnic groups residing in Vermont consist of Asian (0.9%), Black or African American (0.5%), American Indian and Alaska Native (0.4%), Hispanic or Latino (0.9%), and people of some other race (0.2%). University of Vermont Extension and Vermont Agricultural Experiment Station classified 94,553 of 96,888 contacts as White (97.6%). However, National Goal Area 3 programs that focus to improve dietary behaviors reached a smaller percentage of the White population (95%), and a greater percentage of the Black or African American (2% of contacts) and Asian (1.2%) populations. People working on issues in National Goal Area 5 reported contacting higher percentages than the state averages for American Indian and Alaskan Native (1.2%), and Hispanic or Latino (1.4%) populations for their family and community development programs.

Vermont is a strongly rural state, and faces issues associated with access to services and lower incomes. Median household income in Vermont is lower than the national average ($40,856 and $41,994, respectively), even though household size averages are smaller for Vermont (2.44 persons) than the national average (2.59 persons). Vermont also has an aging population, and an increasing number of seniors on limited and lower incomes. The percentage of Vermont children living in poverty increased from 12 percent in 2000 to 14.3 percent in 2001. A lower percentage of female-owned companies exist in Vermont (25.2%) than for the nation as a whole (26.0%), and reliance on farm businesses is higher for Vermont than any other state. The percent of the population living below poverty level is lower for Vermont (9.4%) than the national average (12.4%). Vermont's rural character and small tax base, due to its small population, limits services available to many of the state's low-income families. Many of our programs target these underserved audiences.

Many of our farm food security and nutrition related programs focus on low-income, fixed-income, or senior audiences. Several economic development initiatives combine farming and women's needs by assisting women in starting up or improving food-based entrepreneurships (e.g., Women's Agricultural Network and Northeast Center for Food Entrepreneurship). Family economic and community development initiatives target the more rural areas of the State (e.g. NEK Collaborative program). Many farms in Vermont are small, family run, and bordering on sustainability. Assistance and advocacy for farmers is a key part of Vermont Agricultural Experiment Station and University of Vermont Extension programming efforts, due to the strong reliance Vermont has on its agricultural sector. Youth are another audience with needs that are being addressed through Vermont Agricultural Experiment Station research and University of Vermont Extension. Personnel are working with youth in agricultural, personal nutrition behaviors, food security, education, and community development areas, as well as developing habits to prepare them for financial security as adults.

Funding Allocation

University of Vermont Extension and Vermont Agricultural Experiment Station benefit from a supportive state and federal partnership. State support augments both outreach and research efforts by matching federal funds from the USDA. These critical funds are used by faculty and staff to secure competitive funds and partnerships from other sources. In fiscal year 2002, 33.1% of Vermont Agricultural Experiment Station expenditures were supported by the State and 21.4% were supported by federal Hatch dollars. The remaining 45.5% were secured through competitive grants and contracts earned by researchers. Collectively, these funds supported 185 research projects conducted by Vermont Agricultural Experiment Station during fiscal year 2002.

State appropriations contribute 41.5% of funds to University of Vermont Extension. University of Vermont receives twelve cents for every dollar appropriated by the Vermont legislature to University of Vermont. University of Vermont Extension faculty, staff, and volunteers additionally raised more than $1.2 million in grants and contracts during fiscal year 2002, representing 14% of all funds secured.

FY 2002 Highlights of University of Vermont Extension Outreach and Vermont Agricultural Experiment Station Research

National Goal Area 1: An agricultural system that is highly competitive in the global economy.

Agriculture plays a critical role in shaping Vermont's culture and economic status. One out of every six working Vermonters is employed on a Vermont farm or by a business with a direct relationship to the agricultural industry. Agriculture and the industries associated with it add more than $2 billion to the state's economy, and agriculture is widely recognized as one of the primary driving forces in Vermont's flourishing tourism industry. As New England becomes more developed every day, Vermont has become a virtual island of rural agriculture. While Vermont has only 15 percent of New England's total land area, it contains more than one third of the region's farmland.

Vermont depends more heavily on the success of its dairy industry than any other state. According to the New England Agricultural Statistics Service, the cash receipts for all Vermont agricultural commodities in 1999 were approximately $542 million, 76.2 percent coming from milk receipts. According to the Vermont Department of Agriculture, Food and Markets, the ripple effect on Vermont's economy from milk production annually totals between three and four billion dollars. This cannot be separated from an agritourism business critical to Vermont's economy that approaches four billion dollars, and which relies on the picturesque dairy farmland vistas enjoyed by tourists from around the globe. University of Vermont Extension worked with the public and farmers around the state with an understanding of this important link.

Consolidation and sell-offs since the 1950's have reduced the number of dairy farms in Vermont from approximately 11,000 to 1,400 dairy farms, with a current average farm size of 217 acres and 90 cows. There are still over 160,000 dairy cows in Vermont, including Holstein, Jersey, Brown Swiss, Guernsey and Ayrshire breeds. Each cow produces approximately 16,800 pounds

of milk per year. Despite loss of dairy farmland over the past decade, due to improvements in milk production, outputs have actually increased, when value-added products are included. Vermont dairy farms annually produce more than 2.5 million pounds of milk. Vermont's dairy industry is undergoing many changes as producers strive to compete in national and global markets and adjust to market-based raw milk pricing. Many farms have increased cow numbers in an attempt to realize economies of scale, which introduces new sets of problems. Other dairy farmers have gone out of business, requiring assistance in transitioning out of farming, and making decisions about how to best transfer land. Although milk production remains stable, or has increased slightly, the number of dairy farms and cows in Vermont continues to decline. Therefore, efforts of University of Vermont Extension have targeted management practices designed to enhance annual per-cow profits.

After a banner year in 2001, the expiration of the Northeast Interstate Dairy Compact, this paid farmers a minimum price for their milk, led to reduced and highly volatile milk prices. Combined with a long delay in payments from the new federal financial assistance program targeting dairy farmers (Milk Income Loss Contract or MILC), Vermont dairy farmers faced a year of income loss, increased debt, industry reorganization, and loss of farms. A large role for University of Vermont Extension personnel has been to work with farmers to help them weather the changes in pricing and markets they experienced by assisting them in altering markets, human resource needs, and management strategies.

As Vermont's population grows, there are greater opportunities for dairy farmers to sell to developers in many areas of the state. Although dairy farmland has been decreasing, the growth and success of diversified farming enterprises has allowed for the maintenance of approximately the same number of acres in agriculture over the past decade. University of Vermont Extension and Vermont Agricultural Experiment Station have been modifying their efforts to reflect this change in agriculture for the State.

For many decades, Vermont's landscape has been a strong allure to visitors and residents alike. The $4.2 billion Vermont tourist industry is strongly influenced by visual images of the countryside. In many ways, tourism and quality of community life have become inextricably tied to agriculture. The loss of dairy farms has created concern about conversion of farmland to development. Perhaps the relationship between farming and the quality of life in Vermont is summed up by the following quotation attributed to Frank and Melissa Bryan. "Vermont without farmers could be a good place, but it would never be Vermont; and while there are lots of good places, there is only one Vermont." University of Vermont Extension works with farmers to assist them in maintaining their working landscape today, and for future generations, while improving farming's environmental impacts.

To assure a bright future for agriculture in the state, it is critical that efforts are made to encourage new entrants to farming and to help them succeed. Despite the challenges, many young people, as well as, people seeking a change of careers, are eager to enter into farming as a business. Modeled after the best of more than a dozen similar programs across the country, Land Link Vermont is addressing one of the most serious obstacles to getting started in farming: access to farmland. The program seeks to connect new-entry and relocating farmers with farming opportunities in Vermont and provide them with appropriate information on farm transfer and farm business management issues.

Goat and sheep diary farming are fledgling industries that are diversifying the agricultural landscape and increasing the total number of small farms. Vermont geography and small landholdings lend itself to the growth of small ruminant farms coincident with consumers' interest in visitor friendly farms and knowing where their food comes from. Beginner farmers find small ruminant operations easier to start due to the smaller investment than in cow dairies. Due to the smaller size of goats and sheep when compared to cows, all family members can safely and more easily participate. Vermont has made a name for itself in the quality of its dairy products including cheeses. All sheep dairies and 25% of the goat dairies in Vermont make cheese. Marketing and production management education and quality control techniques are in demand to improve the marketing of Vermont's cheese and to maintain their high status within the marketplace.

Vermonters are very aware of the natural environment of their state. As non-farming residents move into areas near working farms, new conflicts arise. Water and air quality issues raised by residents affect farmers' competitive capacity, as they struggle to expand while addressing increasingly strong environmental legislation. Excess phosphorus has been shown to be the primary cause of impaired water quality in Lake Champlain, which borders the entire western edge of Vermont. Vermont dairy farms have been identified as a source of nutrients contributing to non-point source pollution that negatively affects ground- and surface-water quality. The Federal Clean Water Act requires certain livestock farm managers to develop Comprehensive Nutrient Management Plans for their farm operations to assist in reducing off-farm impacts to water quality. Larger herds, one way to remain competitive for farmers, generate greater volumes of manure. When excessive manure is applied to fields, nutrient loading may occur. The apparent choice between environmental benefits and economic costs poses a dilemma for farmers and policy makers. Extension has been at the forefront in assisting farmers as they strive to remain profitable while also complying with environmental regulations and public expectations. Extension also works with the public to assist them in understanding issues associated with their farming neighbors, and the impact of the industry on their local and state economies.

Management intensive grazing helps livestock farmers minimize production costs while protecting water quality, soil fertility, animal health and the quality of life of the farm family. Grazing is one means of keeping farmland open, preserving scenic beauty, and the animals kept in these systems are visible in the landscape. The Vermont Pasture Network, a project of the University of Vermont Center for Sustainable agriculture, NRCS, and the Vermont Grass Farmers Association, works to improve the economic viability of farms through utilization of their grassland resource. By providing information on grazing systems management, personnel strive to improve the efficiency of farms. The goal is not only to improve the bottom line of farms, but also to ameliorate impacts of farming on natural resources, and to improve quality of life for the farm family.

Vermont beef cattle producers receive 10% less for their weaned cattle than producers in western states; yet they can sell finished cattle for a premium. These factors combined suggest producers can increase their profit by retaining ownership of their cattle. Small herd size and lack of cattle finishing within the state suggest producers work cooperatively to gain efficiencies of scale.

Ornamental horticulture producers (e.g. greenhouses, nurseries), the services of the green industry (e.g. landscaping, tree care, floral design), and the retail establishments built upon this

industry in Vermont (garden stores, florist shops, and similar), together comprise one of the top Vermont agricultural sectors in terms of production, employment, contribution to Vermont's economy directly, and to it's economy indirectly through its impact on Vermont's working landscape. Other important agricultural industries that UVM Extension addresses through its programs include the maple industry, with Vermont receiving the highest amount in cash receipts of any state in the country; the apple industry, comprising $7.9 million and, when value-added products are considered, bringing in $25-28 million in receipts annually for the state; the small fruit and berry industry; and the equine industry, whose economic impact on the state is just now being measured.

Maple production and the approximately 2,400 producers of this product are important to Vermont. To the many producers and retailers, maple syrup production not only provides additional income, it is their occupation and livelihood. Equipment manufacturers, packers, wholesalers, and hundreds of retailers are the other important components of the Vermont maple industry. Major opportunities within this industry include the prospect of improving quantity and quality of sap produced and its positive impact on the finished product -- pure Vermont maple syrup. Improving their management skills in marketing and merchandising to improve business profits are other opportunities and challenges for local producers. It is Extension's role to provide guidance, leadership and educational opportunities for our clientele. Most of Extension's work with sugarmakers is a combination of teaching, providing leadership in the development of educational programs, and advisory or administrative support to county or statewide producer groups. They have also assisted in marketing efforts through educational efforts at fairs, informing people of the various “Vermont imposter” labels, and working with the tourist industry, retailers and growers to put on a Vermont Maple Open House Weekend.

Since every third tree in Vermont is a maple, and directly or indirectly is responsible for hundreds of millions of dollars annually to this state, their health is essential to this state's economy and ecosystem. Accidental introduction of exotic pests is an important national priority. Protection of this valued tree from exotic pests is a primary focus of some extension work. The Asian longhorned beetle poses the greatest threat. Since its discovery in New York City, UVM Extension has developed and distributed educational information to spread the word and increase public awareness of this pest in Vermont, regionally and nationally. This program reduces the risk of ALB reaching Vermont, and assists in the national effort to eradicate this pest.

Apples are an important commodity to Vermont's rural communities and working landscape. Of all the different fruits grown and harvested for sale in Vermont (i.e., strawberries, blueberries, raspberries, etc.), apples comprise 92% of total acreage planted to fruit in the state. The apple industry generates jobs and supports communities and businesses across Vermont. Annual cash receipts are estimated at $7.9 million and, when value-added products are considered, the value of the crop is reported at $25-28 million. For Vermont orchardists, 72% of their total farm income is generated from apple production. In addition, orchards are a part of Vermont's agricultural diversity, contributing to the scenic rural vistas for which Vermont is well known and which generate a significant income for the region from tourism.

The commercial and semi-commercial apple industry in Vermont consists of approximately 85 growers. Due to an increase in imports, higher production costs and lower fruit prices, growers have seen a decline in their revenues. University of Vermont Extension provides educational programs workshops, newsletters and other media outlets, individual orchard visits and

consultations to inform the growers on horticultural management practices and services to enhance orchard productivity while maintaining environmentally sound agricultural practices.

Stakeholder input from three annual VT Equine Industry Summits is driving the set of priorities related to horse safety and liability, business viability, and the initiation of an equine economic impact evaluation in Vermont.

It has become increasingly important for Extension to assist dairy farmers in becoming aware of pricing and risk management strategies. For dairy farmers, there is a problem between supply and demand of milk distributors. Producers have experienced increased rates of volatility since 1995, with prices declining during the period overall. Meanwhile, the cost of living for Vermont farmers has risen. Extension assistance in production, sales, marketing, and insurance plans are key factors to resolving the negative economic effects that increasing price volatility and decreasing production prices has had on Vermont dairy farmers. It should be noted that while producer prices have declined over this seven-year period, consumers are not experiencing lower milk prices on shelves, implying demand for milk by consumers remains stable. Extension will look for ways in the future to address the increasing gap between producer and retail milk prices.

Organic food is the fastest growing segment of agricultural sales in the United States, increasing by approximately 20% each year for the past several years. Consumers spent $11 billion on organic foods in the last year, and projections estimate 2005 organic retail sales to reach nearly $20 billion. The number of state-certified organic farms has quadrupled in the past decade, from 55 in 1990 to 253 in 2002, with much of this growth in the organic dairy sector. Organic farming now represents 24,351 acres of Vermont farmland. Gross sales from certified organic farms in Vermont totaled over $27 million, with $15 million in sales directly from farms. The number of organic dairy farms has grown from three in 1993 to 59 in 2002. Certified organic farms last year covered 24,351 acres (approximately two percent) of the 1.34 million acres of farmland in Vermont. This represents a growth of 34 percent since 1999. Nearly half of organic farms in Vermont produce vegetable crops (primarily sugarbush, cereal grain, assorted vegetables, and feed grain), while another 40% produce pasture, hay, and silage for dairy farms and livestock. The remainder produce maple syrup, Christmas trees, fruits, and other ornamentals. The trend toward increasing consumption of organic products complements Vermont's efforts to strengthen an already strong Vermont "brand" when exporting products, and to maintain an environmentally sound working landscape. It has been shown that retailers can ask an average of up to 15% more for products with a Vermont label, and Vermont organic products have become increasingly common on store shelves along the East Coast and beyond.

Vermont organic farming is comprised primarily of small farms whose primary purchasers are local consumers, marketers and distributors. The new federal standards open the door to stiffening competition from large companies, such as H.J. Heinz, General Mills and Frito Lay, due to economies of scale. Some Vermont organic farmers will also pay a cost to make changes in manure practices, feed mixtures, and harvest practices associated with the new federal standards. Processors may utilize new marketing strategies, especially when working with overseas clients, now that federal standards are in place. University of Vermont Extension will assist organic growers with determining how to meet the new federal standards for organic foods. University of Vermont Extension will also play a role in keeping organic farmers abreast of policy developments, including proposed cost-share programs to help organic farmers with

certification costs, research to develop improved and more efficient organic farming techniques, and ways to promote exports of Vermont organic products.

It is in these ways that University of Vermont Extension supports a healthy and diverse agriculture linked to healthy communities that coexist with a scenic and pristine natural environment.

Key Theme: Agricultural Competitiveness

Making Milk a More Competitive Product -- Milk can be more functional by fortifying some nutrients (vitamins) and soluble fiber. Research was conducted to formulate milk based nutritional beverages containing multivitamins, minerals, and prebiotics such as inulin and oligofructose. Results show that a new prebiotic nutritional beverage is nutritional balanced, prebiotic, and has good functional properties such as color, viscosity, and sedimental stability. This product also meets the microbiological standards and its shelf life is comparable to marketed milk products.

Impact:
The new product will help the dairy industry to compete with other beverages, such as soy beverages. Vermont Agricultural Experiment Station personnel are continuing to work on this project to develop flavored beverages based on this formulation.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

Vermont Maple Open House Weekend -- Tourism and maple syrup producers combined efforts to increase sales in Vermont to people living in other states. To accomplish this, a Vermont Maple Open House Weekend in March of 2002 was developed and implemented by University of Vermont Extension, with the help and guidance of the Chittenden County Maple Sugar Maker's Association, the Vermont Department of Agriculture and other organizations.

Impact:
Ninety-seven sugarmakers participated along with 42 inns and restaurants. Evaluations returned by participating producers and organizations indicated unprecedented success, in spite of the fact that the weekend took place on the coldest two days of the year. More than 2500 visitors came to maple producer facilities around the state. Innkeepers did not report large increases in over night stays, but all indicated that they have faith that this event will eventually create a good spring weekend for the state tourism industry and wish to participate again in 2003.

Smith-Lever funds supported this project.

Characterization of the function of proline-rich cell wall proteins (AtPRPs) in Arabidopsis
--The ability of plants to effectively interact with their environment is controlled, in part, by the structure of the cell wall. The goal of this research is to characterize the function of a family of cell wall proteins (PRPs) in determining cell wall structure, using Arabidopsis as a model system. Genetic studies indicate that PRPs are essential for normal root hair, stomata and lateral roots function. Plant root hairs, lateral roots and stomata regulate nutrient uptake and plant turgor during growth.

Impact:
These results may help us understand how some plants are better able to grow in poor nutrient soils or in response to drought. Results can be used to improve cropland production.

Hatch Act funds supported this project.

Developing unity among leaders in the dairy industry -- Department of Animal Science and Monsanto employees who perceived that there was a lack of cohesiveness in the dairy industry in Vermont conceived the Dairy 2010 group. Extension joined early in the group's formation with the goal of establishing a group of key industry leaders who would meet to discuss timely dairy issues for cooperative action and to identify a "point of unity" that all could work toward. After two meetings with approximately twenty dairy industry leaders, the group found that they were in agreement on several issues, with the rallying point being the support of long-term profitability for Vermont dairy farms. First, the leaders wanted to create a regional economic power; second, they hoped to create a unified VT Dairy Industry Lobbying Organization that represents producers and industry; third, the group hoped to develop an operating environment (policy, education, consumer acceptance) that brings together and serves and supports those who invest in the future of the industry.

Impact:
Already, the dairy industry has been working as a more unified group to confront the issue of milk pricing and the loss of the New England Dairy Compact. They are also working together to reduce the negative impacts of an increasingly consolidated milk processing business.

Smith-Lever funds supported this project.

Improving marketing and production of small fruit and berry farming enterprises -- To remain competitive, commercial vegetable and berry growers need the latest production and marketing information that research, extension, industry and their colleagues have to offer. Commercial vegetable and berry growers need a variety of options for obtaining up-to-date production and marketing information. The 2001 New England Vegetable and Berry Conference and Trade Show held in Sturbridge, MA was planned by a steering committee from six states, comprised of extension, research, industry personnel and farmers. More than 120 educational presentations were given over 3 days, and 105 companies participated in the trade show. Attendance was 1,423 people, including 1,103 farmers. Other educational events are organized for Vermont growers in the winter, and presentations are given at these and other similar meetings held outside the state. This information is supplemented with ongoing production of newsletters, consultations and publications. A survey was sent to 200 commercial vegetable and berry growers in Vermont to determine the impact of extension programs. The 66 growers that responded represent 1,580 acres of field production, 370,124 square feet of greenhouse production and average annual gross sales of $78,444 per farm. Over the past 3 years, 89 % of the growers reported reading the vegetable and berry newsletter, 83 % e-mailed or called Extension with a question, and 76% used the University of Vermont soil test recommendations, which were written for vegetable and berry crops.

Impact:
Of the 167 attendees of the 2001 New England Vegetable and Berry Conference and Trade Show completing evaluations, 67% said that attending the conference would enhance the profitability

of their farm, 75% said that their management of soil would improve, and 86% said that their management of pests would improve. According to evaluations, 84% of participants found out about a new source of information, and 73% planned to adopt a new practice the following year as a result of attending the conference. Of 66 farmers surveyed over the past three years, 89% of respondents reported that University of Vermont Extension's educational services and programs have improved the profitability of their farm, 83% said they improved management of soil or nutrients, 85% said they improved management of pests, and 83% have adopted a new practice on their farm as a result of these programs and services.

Smith-Lever funds supported these endeavors.

Key Theme: Agricultural Profitability

Dairy Profitability Enhancement Pilot Project -- Dairy represents by far the most important economic sector of the Vermont agricultural economy. Many groups and organizations have identified profitability as the most important single area of need with regard to education for dairy farmers in the state. The Vermont Dairy Profitability Enhancement Pilot Project (DPEP) was fashioned after a successful Minnesota program meant to address farm profitability using a professional team approach. Each farm has a "professional team" assessing needs alongside the farm family. The team makes recommendations for "priority areas" on which to focus. Priority areas can be such items as "heifer raising", "estate planning", or "feed handling" etc. In all cases, priorities determined by the farm team ultimately relate to quality of life and improvement of profitability. An Extension faculty member leads each team. The PEP project was implemented on four farms (one each in Rutland, Chittenden, Grand Isle and Orleans counties). Each farm has a unique professional team comprised of professional consultants who normally work with the specific farm families. On each farm, the team and the farm family set priorities jointly. Each team will eventually establish goals based on the two to three farm priorities. The team leaders are collecting base data during the first months of team organization. A set of quantitative tools will be adopted/adapted to accumulate farm data. FINPACK software will be used on each of the farms for economic data monitoring. VT CropMD will be used on each farm for the cropping data monitoring. DHI records will track dairy herd quality measurements.

Impact:
Impact reported primarily in the second quarter was reported to the VT Department of Agriculture in the DPEP final report, September 23, 2002. Impacts included initiation of estate planning changes, raising heifers off- site by a contract company, modification of dry cow housing, FinPack financial analyses, people management changes, and more. The Vermont Department of Agriculture generously awarded the VT Dairy PEP pilot with a grant for $16,257 for FY02, which has been disbursed in support of salaries for five faculty members, and provides monies for travel expenses and team support. Additional short-term (FY2003) support from the Department is anticipated, while contracts for a much higher level of funding have been identified and a small team of Extension personnel is assigned to develop this new financial opportunity.

While the teams associated with individual farms are in various stages of development, the team in Chittenden is most advanced. This team was established through the visit of Vern Oraskovich, Minnesota Cooperative Extension Service. A number of changes have occurred since the first team meeting. The farm signed up for DHIA and the vet is working with the farm

owners to review the reports and analyze the information on pregnancies and days in milk to incorporate the information into management decisions. A silage storage area built near the milking barn with a Wilsonite foundation cost seventy-five percent less than one built with concrete. The farm owners decided to have heifers raised on a contract basis at a cost of $1.65 per animal per day. This reduced overall labor requirements and released more feed for outside sale or to feed the cows. University of Vermont Extension reviewed several options regarding estate management with the farmers.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Hormonal control of growth and energy use by chickens deficient in amino acids -- Amino acids affect growth and hormonal function in chickens. This project examined the physiological effects of dietary amino acid deficiencies. Growth hormone was unchanged in arginine-deficient chicks but elevated in a phenylalanine (Phe) deficiency. Insulin-like growth factor-I was depressed in both cases revealing different interactions between the two. Thus, amino acids have differing effects on the endocrine system.

Impact:
These results will aid in formulation of optimal diets for chickens, will promote economical production of meat and eggs, and will help reduce environmental nitrogen contamination.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

Increasing farmer knowledge about milk pricing, markets, and farm-oriented public policy -- It is critical during this period of economic crisis for New England farms that farmers have a clear understanding of how milk pricing, marketing, and policies are constructed. Milk price fluctuations are beyond the control of individual dairy producers. Therefore, farmers also need to increase their understanding about the economic risks of dairy operations, and the tools available to cope with those risks. The 2002 Farm Bill passed by Congress incorporated several important changes that have impacts on farmer's management decisions. University of Vermont Extension provides milk pricing, marketing, insurance, and policy information to farmers, processors, policymakers, and related people and organizations in the dairy industry. Information is delivered via educational seminars (9), publications (21), and radio appearances (2).

Impact:
An average of 80 percent of clients (515) were found to increase their understanding of milk pricing, marketing, and policy information shared through the various media used. Additionally, fifty farmers and farm service workers demonstrated an increased understanding of dairy futures and options contracts associated with the economic risks of dairy farming. Fifty farmers who participated in the workshop showed increased understanding of the new 2002 Farm Bill and how it would affect their farming enterprise.

Smith-Lever funds supported this project

Balancing economic and environmental impacts of phosphorus management -- Many Vermont dairy farmers apply excess fertilizer or other nutrients on their fields, leading to increased input costs and potential for adverse water quality impacts. A major area of emphasis for University of Vermont Extension, and part of the Vermont Dairy Sustainability Project, has

been to improve nutrient management of dairy farmers in ways that maintain their ability to economically compete.

In order to limit negative economic impacts on already struggling dairy farms while ensuring farmers reduce the negative impacts of farming on water quality through phosphorus use management, a study was conducted to determine how farmers could reduce phosphorus at the least cost. Analyses on financial and environmental impacts indicate that dairy feed reformulation; adoption of nutrient management advisors, and implementation of row crop field buffers provides the least cost combination of management practices, and achieves an eight percent (8%) reduction in phosphorus in Lake Champlain. The study shows that achieving a greater reduction will have significantly greater costs.

Combining research with outreach efforts, University of Vermont nutrient management experts worked with a pilot farm to test the economic, as well as environmental feasibility of nutrient management recommendations they were making for farmers. With assistance from a nutrition advisor, fertilizer representative, Extension staff, project coordinator, and the farmer, a nutrient management plan was developed and implemented on the pilot farm.

Impact:
Results of the economic analyses are being applied to outreach efforts for Vermont dairy farmers. During the most recently analyzed crop season of the pilot farm, fertilizer application rates on a portion of corn acreage were reduced, leading to a $2,800 savings, with no difference in feed output. University of Vermont Extension is working with various agricultural industry firms and Ben & Jerry's to document and assess nutrient management practices used by Vermont and New York farmers for cows and crops (currently a total of eight farms, seven residing in Vermont), and to assist farmers in implementing improved practices.

Hatch and Smith Lever funds were used to bring this project to fruition.

Assisting farmers in developing cost-effective management strategies -- Many Vermont dairy farmers have been faced with losing their farms during the past year due to reduced milk prices. The crisis emerged after the loss of the New England Dairy Compact combined with the long delay in funds designed to assist farmers as milk prices plummeted. Well managed and poorly managed farms alike, are up for sale. University of Vermont Extension personnel made personal calls and visits to farmers over the second half of the year. In response to this crisis more than 415 individual farms visits were completed and there were more than 580 distinct farmer contacts during the last six months of 2002. Consultations covered topics on feeding, milking, reproduction, record keeping and utilization of records, insurance, facilities, labor, and other areas of concern.

Impact:
A couple who decided to farm five years ago found themselves in difficult straights after investing more than a hundred thousand dollars and giving up their full time jobs to begin a heifer-replacement farming enterprise. This past summer they called looking for immediate assistance. University of Vermont Extension personnel made feed management and health recommendations that were adopted by the farmers. The farmer reported major improvements in the physical appearance and growth of their calves within ten days. The farmer was also

encouraged to start weighing and measuring growth of their calves to have data to verify they were making progress.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Implementing management intensive grazing strategies -- Many beginning livestock farmers need to adopt cropping and nutrient management systems that are low-capital and low- labor intensity, while providing high quality and high yielding feed sources for their production animals. Management intensive grazing (also referred to as grass farming, rotational pasture management, and prescribed grazing) offers a solution to those who are open to the system. This system allows any kind of agricultural land, even marginal, to be productive and efficiently used. University of Vermont Extension, through the work of specialists and the University of Vermont Center for Sustainable Agriculture's (CSA) Vermont Pasture Network (VPN), provided assistance to more than 500 farmers this past year. In collaboration with VGFA and the Northeast Organic Farming Association's Dairy Technical Assistance program, CSA staff organizes an annual grazing conference that provides education for beginner and advanced grass farmers and agency personnel. In 2002, 300 people attended the grazing conference.

Impact:
One of the farmers seeking consultation from University of Vermont Extension reaped rewards for changing management practices. By implementing recommendations to graze animals earlier and in a location further from the barn, the farmer gained two weeks more grazing, and saved another pasture for later grazing, thus increasing his over-all harvest from grazing by a month (estimated). This resulted in increased milk production for a longer period of time, and lower costs in purchased feeds. Over 200 hundred farmers belong to the Vermont Grass Farmers' Association, which was founded in 1995 by the Vermont Pasture Network, supported as part of University of Vermont's Center for Sustainable Agriculture by University of Vermont Extension dollars. Sixty-five percent of these members have adopted new farm practices as a result of VPN collaborative and outreach efforts. One participant of the 2002 grazing conference said, "I came away from the conference feeling inspired and informed, with a renewed faith in how we value our quality of life on Vermont farms."

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Farm Labor Pool Initiation -- To maintain a profitable enterprise, farmers need a well trained temporary workforce to enable them to leave the farm with a trained, responsible person to take over operations for a day, week or longer. A pilot program to recruit, assess skills and refer workers to farms was developed by University of Vermont Extension.

Impact:
Through the program, 39 workers have been successfully recruited and placed on farms. Participating farmers reported that they were pleased with efforts to date and desire the pool to be maintained as an organized business. As a result, a Farmer Cooperative has increased its membership and created the temporary worker business for its members.

Smith-Lever funds supported this program.

Women's Agricultural Network (WagN) -- USDA figures show that the number of woman-owned farms is increasing, and Vermont statistics support the data. Sound management practices are critical to farm sustainability and profitability. Statistics also indicate, however, that the number of women benefiting from USDA is far from equal to the numbers of male farmers currently accessing these services. The Women's Agricultural Network (WAgN), originally funded through a USDA Technical Assistance Program, provides education and technical assistance for women farmers and introduces them to the services and programs of the USDA. Since its inception in1995, WagN has grown to include 1,040 members in Vermont, and 189 out-of-state members. While 635 individuals have received technical assistance and 780 have attended workshops conducted through WagN, 1,600 households actually subscribe to the WagN quarterly journal.

Impact:
Since the program's inception in 1995, two hundred members have completed business plans, and the WagN program has expanded to two other states (Maine and New Hampshire). WagN leaders conduct a class called "Growing Places" for women who are or are considering becoming farmers. Based on follow-up surveys sent to 110 class attendees between six and eighteen months after class completion (44% response rate), 77% of respondents reported they increased their awareness about whether agriculture was the right field for them, and 85% increased familiarity with agencies and organization having useful information available to them for expanding or developing a farm business. According to respondents, participants used skills gained from the class to accomplish the following tasks:

- 46% developed comprehensive goals incorporating farm businesses with family values and lifestyle needs;
- 52% identified current resources available to them (e.g. capital, land, buildings, people, markets) and evaluated how these could be used more efficiently;
- 33% analyzed or used financial tools, such as income statements and business plans, for their businesses; and
- 31% developed marketing plans for their farm businesses.

Since completing Growing Places, one member opened an herbal gardening business and provided leadership to form the Vermont Herb Growers Association. Another member opened a business growing custom-started plants for gardeners and landscapers, and spearheaded an effort to plant over 5,000 daffodils as a living memorial to the victims of the September 11 attacks.

Smith-Lever funds supported this program.

Key Theme: Risk Management

Farmedic Training -- Fire and Rescue personnel typically do not have a farm background. However, understanding farm layouts and functions can increase their efficiency at assisting farmers who are injured while working with heavy farm machinery, and reduce damage to critical farm assets in cases of emergency. The Farmedic course orients class participants to the workings of a farm. The course in Hartland was an integration of the Vermont Farmedic course with the New York Farmedic course, and was co-taught by instructors from each program.

Impact:
Of the 66 students who completed the Farmedic course this past year, 75% indicated they would adopt at least one new safety technique introduced. Eighty percent of attendees reported that they believed their farm was safer as a result of changes adopted. Ninety-five percent of participants stated that they intended to change their department's standard operating procedures when responding to an agricultural emergency. From a social perspective, the local emergency response will be safer and more efficient, and the providers much better prepared.

Smith-Lever funds supported this project.

Key Theme: Animal Health

Preventing mastitis -- Another area of research and outreach emphasis for the dairy industry is the prevention of mastitis cases, which are common in dairy cows. Mastitis costs the dairy industry approximately two billion dollars annually, and is the most costly disease to dairy producers. Losses are from reduced milk production, discard of milk from cows being treated with antibiotics, and reduced milk quality. Vermont Agricultural Experiment Station and University of Vermont Extension are attempting to reduce the negative impacts of mastitis on the dairy industry through a number of research and outreach efforts. The necessity for a coordinated effort to study resistance of the dairy cow to mastitis resulted in the design and initiation of a multi-state research project that includes 17 research stations and more than 45 research members. A greater understanding of the organisms responsible for causing mastitis, bovine defense systems, and new methods for enhancing host defense mechanisms ultimately will supply an advantage over current techniques and maintain the safest milk supply in the world.

DNA-based Vaccines to prevent mastitis -- Research efforts include the development of new vaccines to combat mastitis using novel DNA-based technology. *Staphylococcus aureus* is a contagious pathogen that often results in a chronic condition in cows. Current vaccine formulations are often ineffective in preventing this infection. A study was conducted to stimulate an immune response in dairy cows through the injection of plasmid DNA designed to express staphylococcal Protein A in transfected cells. Intramuscular and intradermal vaccination sites were evaluated using a plasmid containing the CMV promoter/enhancer directing expression of Green Fluorescent Protein (pcDNA3/GFP). Cows demonstrated moderate immune responses to the DNA-based vaccines, and vaccinated animals were able to mount a greater antibody response to an antigen challenge.

Impact:
Results are likely to stimulate further investigation into the use of DNA-based vaccines for animals.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

Development of genetically modified cows resistant to mastitis -- Another approach to reducing rates of mastitis infections is to generate transgenic dairy cows with enhanced resistance to microbial infection of the mammary gland. Vermont Agricultural Experiment Station researchers have recently generated transgenic mice that contain the bacterial gene for lysostaphin, a potent staphylolytic enzyme. The mice produce lysostaphin in their milk resulting in substantial resistance to infection when challenged with *Staphylococcus aureus*. Enhanced resistance to infection will enhance animal welfare, and reduce the need to use antibiotics in dairy production. An unexpected finding of this research is that transgenic mice have lower lactational ability than non-transgenic mice. To control for offspring traits, non-transgenic pups were cross-fostered onto either transgenic or novel non-transgenic dams. Growth rates of non-transgenic pups suckling transgenic dams were less than that of non-transgenic pups suckling non-transgenic dams. However, by three months of age the transgenic-fed animals have normal body weights. It has not yet been determined whether lysostaphin per se is causing the reduced growth, or if mammary development has been altered by the presence of the transgene. Mammary growth and expression of milk protein genes are being followed throughout gestation and lactation in current studies, and pup intestinal growth and morphology is being evaluated.

Impact:
Information will be used to develop transgenic mastitis-resistant dairy cows.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

The Vermont Initiative on Animal Production and Food Safety Education -- Vermont livestock producers need to increase their knowledge and understanding of food safety. Workshops were conducted to increase knowledge and change management practices relating to disease control, particularly in dairy cattle.

Impact:
Participants increased knowledge and changed management practices. As a result of this project, more than half of the 17 respondents made more than six recommended management changes on their farms.

Smith-Lever funds were used in part or in full to develop this project for the State of Vermont.

Reducing the spread of Johne's disease in dairy herds -- Dairy herds need to be vigilantly monitored and tested for Johne's disease in order to maintain the value of cows and sires to potential purchasers. Prior to being accepted for financial assistance for Johne's disease testing, a contagious disease, a farm is required to have a management plan for dealing with the disease. If disease prevention techniques are not put in place, the disease may continue to spread. If herds have adopted management plans they qualify for financial assistance for testing.

Impact:
University of Vermont Extension met with 33 farmers about ways to prevent the spread of Johne's disease and to assist in developing management plans in case the disease is found in their herds. University of Vermont Extension also helped to certify seventeen more veterinarians to test for Johne's disease around the State. Thirty farms participating in educational programs demonstrated increased knowledge about how to prevent the spread of the disease. Twenty-five farms showed that they had adopted new practices designed to reduce the spread of the disease in

their herds. Eight of these farms also showed that changes implemented as a result of these educational programs actually led to increased milk production.

One herd had several positive test reports and the owner panicked for assistance when he lost a "contract" to purchase bulls because the purchaser did not want any future sires from infected herds. The owners implemented major reconstruction of the buildings to help prevent future spreading of the disease in the herd. Had they waited, this construction would have been delayed for another year or two, the disease would have expanded throughout the herd, and the disease may have put the farmer out of business.

Smith-Lever funds supported this outreach project.

Whole-herd health program for retained ownership and natural beef feeding programs -- The market for natural beef, raised without hormones or antibiotics, is increasing. Combining cattle from many farms at a feedlot is an efficient way to finish cattle, but is stressful and can result in respiratory disease. Feeding antibiotics prevents disease but is not an alternative for natural beef. Producers were trained to prepare natural beef for feedlots, minimizing their risk of losses from illness. A veterinarian developed vaccination and management guidelines and answered producer questions at a workshop.

Impact:
The guidelines will be published as Extension Fact Sheets. Producers will benefit from healthier cattle that gain faster, and from less death loss.

Smith-Lever funds supported this project.

Key Theme: Small Farm Viability

Effect of heating velvet beans on blood chemistry and organ pathology in growing chickens -- The velvet bean plant is used by subsistence farmers worldwide, but the raw seeds are toxic. This project examined ways to make velvet beans (VB) safe for human and animal consumption. Roasting VB partially or wholly reversed negative effects on growth, weight of pancreas and stomach, length of intestines, elevated blood cholesterol, intestinal musculature, and kidney pathology.

Impact:
Proper processing will allow safe use of VB for humans, chickens, and other animals, thus supplying an economical source of nutrients for farm animals and families living at subsistence levels throughout the world.

Hatch Act funds supported this project.

Key Theme: Managing Change in Agriculture

Linking farms with farmers -- Land Link Vermont (LLVT) began in 1998 with a mission to connect and relocate farmers who want to farm in Vermont with farmland owners and farming opportunities. Additionally, LLVT provides information, guidance and support for farm start-ups and intergenerational farm transfers. LLVT uses a relational database to provide participants

with potential matches and to track on-going participation in the program. Four hundred and five farmers and landowners have participated in the matching service over four years. More than 300 farmers attended one of nine workshops organized and/or co-sponsored by LLVT during 2001-2.

Impact:
In a typical year, more than 60 requests are made to pursue a farmer-to-farmland match. It takes time to build matches for successful long-term farm transitions. To date, Land Link Vermont has made twelve matches affecting 2,643 acres of farmland. LLVT teamed with legal organizations to offer a two-day seminar for attorneys, Extension and other professionals on intergenerational transfer of farm assets. Of the 72 participants, 100 percent of respondents completing a six-month follow-up evaluation said the seminar increased their understanding of family farm business succession. As a result of the training, interested service providers agreed to provide free one-hour consultations with LLVT participants.

Because only about one third of the program's farm seekers indicate that they have a business or financial plan in place, LLVT staff explored business-planning curricula for participants. After attending NxLevel training, University of Vermont Extension personnel joined with the Intervale Foundation, Vermont Farm Bureau, Vermont Farms! Association, and the Vermont Food Venture Center to pilot a business course for new and transferring farmers during 2002. Twenty-two individuals representing 14 farm businesses attended.

Smith Lever funds were used in part or in full to develop these projects for the State of Vermont.

Key Theme: Animal Production Efficiency

Enhancing bovine mammary development to improve milk production efficiency --
Mammary development has a major impact on milk production of dairy cows. The purpose of this project is to identify key genes that control mammary development and milk production. Previous work identified a number of genes that appear to control mammary growth. Results of further studies on a subset of these genes support their roles as growth regulators. Additional experiments were conducted that will provide samples to further evaluate the importance of these genes.

Impact:
Results show promise in the manipulation of these genes through selection or management, which may lead to improved milk production efficiency, thereby enhancing profitability for dairy farmers.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

Determining the effect of feed level and bovine growth hormone on the regulation of mammary development and lactation in dairy cows. -- Mammary growth in heifers is very important in predicting future milk yield of dairy cows. Mammary development is not optimal, thus decreasing lifetime milk yield in dairy cows. The purpose of these studies is to identify the role of feeding level, growth hormone and TGF-beta in mammary development and lactation. Three heifers were implanted with TGF-beta. Effects on the mammary tissue are being evaluated. TGF-beta decreases mammary cell growth and increases cell death in culture. Gene

expression is altered to reflect changes in the cell cycle. Results of a concomitant study of the effect of feed levels and bovine growth hormone on the regulation of mammary development and lactation, using TGF-beta binding to the mammary tissue as a measure, indicated that mammary development was affected by feeding level in young heifers.

Impact:
Results of studies increase our understanding about the factors controlling mammary growth in heifers. This information can be used to increase lifetime milk production and quality in dairy cows.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

Regulation of nutrient use and amino acid and peptide transporters in dairy cows -- The development of optimal feed ingredients and feeding strategies can increase milk production and quality in dairy cows. Considerable variation exists in how nutrients are used for milk synthesis in dairy cattle. A study was conducted to further understanding of the regulation of nutrient use in lactation. Results from two different experiments indicate rumen fermentation and post-ruminal digestion can significantly alter patterns of nutrient absorption, milk yield and milk composition. Results from a third study indicate that the variation in metabolic capacity between animals is a function of multiple enzymes in catalytic and biosynthetic pathways.

Little information exists regarding amino acid and peptide transporters in the small intestine of ruminant livestock. These studies determine whether ruminants have the same transporters for amino acids and peptides as monogastric animals. Five amino acid and peptide transporters have been confirmed in bovine intestinal tissue. The biochemical activities of the transporters have been evaluated.

Impact:
The first two experiments demonstrated that use of feed supplements to improve milk yield and composition is dependent on the digestibility of other dietary constituents. The results of the third study will be used to design more experiments that will lead to increased knowledge of the hormonal regulation of nutrient utilization. The amino acid and peptide transporter study will allow for further examination of the capacity for amino acid absorption in the small intestine and determine the impact of gut metabolism. Study results can be used to better optimize feed constituents and feeding strategies for dairy cows to increase milk production and quality.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

Improving forage quality -- Predicting the changes in quality of the first harvest of forages would improve overall forage quality on dairy farms and thus improve profitability. Vermont Agricultural Experiment Station personnel developed models for predicting forage quality of grasses and mixtures. As a complement of that project, on-farm evaluations for alfalfa using some existing models were conducted. Researchers found forage quality was affected by temperature and plant maturity techniques implemented.

Impact:
Although the farmers did not use this information this year, the techniques will be repeated this coming year as a management tool now that research has been completed.

Hatch Act funds supported this project.

Key Theme: Biotechnology

Appraising the Use of Technology and Production Practices on Vermont Dairy Farms -- Vermont's dairy industry is undergoing significant technological and demographic changes. As University of Vermont Extension entered the 21st century there was a need to have strong knowledge of the state's dairy industry. Information collected included a breakdown of herd size, milk production, crop acreage, technologies in use, labor characteristics, operator characteristics, plans, and operator satisfaction and future concerns. The return rate was 60 percent from approximately 1,450 dairy farms.

Impact:
In summary the survey identify the following: Average herd size is 115 cows but median herd size is only 70 cows; Operators' average 49 years of age and are most likely to have farmed for more than 20 years; nearly 15% of the state's dairy farms sold more than 20,000 lbs of milk per cow while 5.4% produce less than 10,000 lbs per cow; nearly 47% of farms use grazing, averaging 61 cows vs. 163 cows for non-grazing farms, and produce 3000 pounds less milk per cow than non-grazing farms; dairy farmers are most dissatisfied with time away from the farm, profit level, and anxiety/stress level. Areas of greatest concern are milk prices, real estate taxes, and environmental regulations. These results will help identify key areas to focus outreach efforts in the coming year and in preparation for the next five-year plan of work.

Smith-Lever funds were used in part or in full to develop this project for the State of Vermont.

Determining effects of pH and temperature on cream cheese shelf life -- Approximately 700 million pounds of cream cheese are produced annually in the United States. Degradation of cheese determines its shelf life. This study aimed to determine whether the pH of cream cheese made with locust bean gum (LBG) influences temperature-dependent changes in the serum phase during storage. Ph was either raised or lowered through exposure to acetic acid or ammonia, respectively, or left alone as a control. Cheeses were stored at either 4 degrees or 20 degrees Centigrade. Stored samples were analyzed every four days for twenty-eight days. Expressible serum (ES) was extracted for analysis by centrifuge. Amount of ES obtained increased at higher temperatures and pH levels. The ES was analyzed for viscosity (viscosity decreased during storage). Viscosity decreased more rapidly at higher temperature and with higher pH levels. Results suggest that the state of LBG within the serum phase of the cheese changed in a temperature and pH-dependent manner, possibly due to microbial degradation of LBG. Follow-up studies of LBG showed that LBG solutions not containing potassium sorbate developed high counts of yeasts, molds, and aerobic bacteria. Viscosity changes were also halted with the addition of potassium sorbate to LBG solutions, even after 56 days of storage. Data suggest that the loss of water holding capacity and development of syneresis in cream cheese during aging may be caused in part by microbial degradation of the stabilizer (LBG).

Impact:
Information gleaned from this study will help to increase shelf life of cream cheese.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

Key Theme: Ornamental/Green Agriculture

Improving greenhouse spraying technology -- The greenhouse industry is a vital component of the new, diversified agricultural economy in northern New England. The greenhouse-based horticultural industry in Vermont includes more than 400 firms having an income approaching 200 million dollars. This does not include value-added horticultural enterprises. The industry showed income growth of 34% between 1993 and 1998, and employs approximately 5000 people. Nearly 9,000 acres of Vermont's agricultural land are dedicated to the horticultural industry.

In order to develop more sustainable greenhouse crop practices, and to reduce the industry's traditional reliance on chemical pesticides, a research and outreach program underway serves to provide technology and information to promote successful reductions in the use of chemical pesticides on greenhouse crops. Researchers at Vermont Agricultural Experiment Station have developed a custom spray system with a programmable platform that allows users to pass banks of flowers through a defined spray stream to determine how far the spray penetrates multiple rows of plants. Solid full cone and flat fan nozzles were found to provide excellent penetration and coverage using moderate nozzle sizes. Hydraulic and electrostatic sprayers were tested to determine the influence of spray speed on spore deposition in the crop. Slower movement through the crop (39 versus 59 feet per minute), coupled with spray treatment from both sides of the banks of plants, increased the number of spores deposited and penetration through the canopy. Electrostatic sprayers were found to be less effective in coverage and penetration compared to hydraulic sprayers, and tests indicated that electrostatic sprayers might not deposit a sufficient number of spores to infect and kill insects. Educational workshops reached more than 120 attendees, with more than 40 from each of three states, New Hampshire, Vermont and Maine. After demonstrations followed by hands-on trials, attending growers were surprised to see that even when plants are sprayed to run-off with conventional sprayers, consistent coverage on leaf undersides was not guaranteed. An Integrated Pest Management pocket guide, when completed, will have four general sections specifically addressing concerns for northern New England horticultural growers: general cultural considerations, insect pests, biological control, and pant pathogens. Draft text for all sections is nearing completion and most photos to be included have been obtained.

Impact:
The program has succeeded in developing a system to optimize spray practices for insect-killing fungi, educate greenhouse growers about the system in Maine, New Hampshire and Vermont, and produce a greenhouse Integrated Pest Management Pocket Guide tailored to northern New England growers.

Hatch and Smith Lever funds were used to bring this project to fruition.

Western flower thrips temperature sensitivity for New England greenhouse growers -- The western flower thrips (WFT) is a persistent and devastating pest to the greenhouse industry, particularly because of its ability to transmit plant pathogenic viruses. There is uncertainty if WFT survive winters in northern latitudes of the United States. Development of management strategies would be influenced by knowing whether WFT overwinter or if outbreaks result from

infestation on incoming plant material. A study underway is designed to provide new information about lethal responses of WFT larvae and adult females to low temperatures. Results of the study show that survival of all larvae and adult females occurs at –10 degrees centigrade, while complete mortality occurs at –20 degrees centigrade.

Impact:
This information will facilitate the development of cultural practices centered on low winter temperatures for greenhouse growers. Fecundity of surviving adult female WFT is now being examined. New work is also being done to compile information from growers about current practices used to manage thrips populations, and the perceived effectiveness of these practices.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

Key Theme: Niche market

Developing sheep grower niche markets -- The Northeast area of the United States contains the largest lamb market in the world. Lambs sold to this market come from the Western part of the United States, Australia and New Zealand. The only way Northeast sheep producers can compete in this market is to identify a brand of meat that can be marketed as a superior product that will bring a higher price to the sellers. . University of Vermont Extension personnel worked with a small number of producers who joined forces to identify a product, and who are presently marketing to restaurants in New York and Boston. However, this only represents one product from the Northeast. The New England Livestock Alliance has been working with University of Vermont Extension specialists, farmers and other livestock specialist in the Northeast to lay the groundwork for producers in this area to provide animals for specialty markets in the Northeast.

Impact:
The New England Livestock Alliance is in the process of establishing a much larger market for lamb and other meats from the Northeast. As part of this effort, a slaughter facility in Stafford Springs has done extensive modifications to process and market animals. In addition, this group has made contact with a producer group in France and is presently seeking the advice of this group. The animals and farms that supply this market will be identified with a specific brand and the ultimate result will be a return to area farmers that is 25 to 30% above commodity prices.

Key Theme: Organic Agriculture

Organic food industry and its potentials for improving farm profitability -- Organic food has emerged as an important food industry and there is a growing need for information on consumer demand. This project examines the potentials of Vermont's organic food industry and provides economic and market information. Results based on a conjoint survey suggest that consumers are willing to pay significantly more for organic apples and milk produced in Vermont and that the valuation of and willingness to pay for organic food products are different across groups.

Impact:

Information from this project will be used by Vermont organic farmers, consumers, and policymakers.

Hatch Act funds supported this study.

Organic Farming Outreach Initiative -- University of Vermont Extension personnel chaired a conference on "Working with Organic Farmers: Enhancing Agency Involvement in the Northeast," held in September at Kerhonkson, NY. Sponsored by the Center for Sustainable Agriculture, University of Vermont Extension, and Northeast SARE (Sustainable Agriculture Research and Education) program, the two-day event included presentations by exemplary organic farmers, ecological agriculture researchers, agency personnel, and officials from the national organic standards program.

Impact:
Of the 150 people attending, 93 percent said the conference increased their understanding of organic agriculture.

Smith-Lever funds supported this project.

Key Theme: Home Lawn and Gardening

Developing Master Gardeners -- There is a need to educate homeowners regarding the biology and life cycles of insects and diseases so that pesticides are used in a judicious manner by the public. The program teaches interested gardeners many safe and judicious gardening practices during 14 interactive television sessions over a semester. Trainees also learn about food security, environmental and public beautification issues. Trainees then complete forty hours of community service related to gardening to obtain their certification. The Master Gardener program now has 1,012 members around the State of Vermont.

Impact:
This past year, 645 consultations via the Master Gardener Helpline and e-mail resulted in reduced pesticide use by home gardeners. Through efforts of the Master Gardener program, an additional 223-trained volunteers assisted in community outreach projects focused on environmental awareness, food security and public beautification. A total of 901 interns volunteered 8,900 hours to these efforts. As a result of the program, Vermonters are increasingly employing low-impact pest management practices that promote strong plant growth coupled with a decreased use of chemicals. This results in stronger, healthier crops and contributes to a decreased use of pesticides in the home garden.

National Goal Area 2: A safe and secure food and fiber system.

Children and adults across the State of Vermont can sometimes face the experience of lacking continuous access to a nutritious, safe, acceptable, and affordable food supply. Food security is an issue in the remote rural areas of the state and in the populated urban areas, affecting people of diverse ages and backgrounds. In 1999, USDA released estimates on the prevalence of food insecurity and hunger by state. In Vermont, an estimated 7.7% of households were food insecure, and 2.6% were food insecure with hunger during the period between 1996 and 1998.

For this reason, the new Healthy Vermonters 2010 report includes the objective to "increase food security to reduce hunger" statewide. In stark contrast to this lack of food security for so many Vermonters is an agricultural state that prides itself on production of a wide range of healthful and tasty products that are enjoyed by millions of people across the country. A focus of University of Vermont Extension and Vermont Agricultural Experiment Station is to address food security issues affecting those lacking access or purchasing power to maintain adequate diets. Two programs in particular aim to improve food security through education. The Farm Share for Seniors program increased confidence of consumers living in subsidized housing about their own food security by 56 percent, while also assisting communities to support one another, and improving nutrition-related behaviors. EFNEP supported programs also increased confidence and behaviors leading to increased food security and quality diets for low-income adults and children.

Since 1991, the USDA/CSREES food safety contacts from the six New England land grant universities have worked together on a variety of collaborative food safety initiatives funded by USDA food safety competitive funds. The New England states are small in geographic area and have similar food safety concerns. The food industry is generally characterized by small and medium sized operations producing a variety of specialty foods. In 1998, collaborative efforts were expanded to include the entire northeast region and beyond. Faculty have worked with faculty from New England, New York, Wisconsin, Washington and West Virginia on food safety programs that emphasized reducing microbial contamination on produce, in cheesemaking, and during meat processing. Many of these collaborative food safety projects have received national recognition. For example, the FDA has selected "Looking for A SAFE Harbor", a food safety curriculum targeted towards volunteer cooks, as the guideline on how to best train volunteer cooks. In addition, the Conference for Food Protection, a state regulators' group, has added SAFE Harbor to the CFP's guidelines for use to train volunteers at temporary food establishments. University of Vermont Vermont Agricultural Experiment Station and University of Vermont Extension HACCP reviews have led to recommended changes for all meat-processing plants by the Vermont State Department of Agriculture. Research efforts on raw-milk cheesemaking processes may further aid the strong market for Vermont made raw-milk cheeses through the implementation of increased quality and safety controls.

In the fall of 2000, the New England land grants were awarded USDA food safety funds for a project entitled "Using Good Agricultural Practices (GAP) to Integrate Food Safety Principles Into Small Farm Production". The proposed unified regional program would integrate research initiatives with innovative educational approaches that benefit the small farmer with their implementation of voluntary GAP practices. Pre-implementation survey results of over 600 farms by the New England Good Agricultural Practices (GAP) project indicated that just half of the farms had health and sanitation-training programs in place, and at least 70% of respondents desired more information on on-farm safety, manure application, personal health and hygiene, use of sanitizers, good agricultural practices, and microbial hazards. A consumer survey distributed as part of the same project showed that New England consumers do not feel highly confident about the safety of domestically produced fruits and vegetables, with most respondents indicating they thought food contamination occurred before being stocked in retail outlets. New England consumers also indicated overwhelmingly that they would be willing to pay more for fruits and vegetables grown on GAP certified farms. The results of these surveys are playing a strong role in adapting and revising curricula to develop more relevant outreach efforts. In 2000-2003 NFSH faculty will collaborate with faculty from a variety of disciplines on two multi-state,

interdisciplinary projects targeted to growers with the goal of reducing microbial contamination on fruit and vegetables produced in the Northeast. These projects will involve faculty with expertise in agriculture, horticulture, community development, and nutrition and food safety. Growers, truckers, wholesalers, retailers and consumers are also involved in the development and implementation of the projects.

Researchers from the Centers for Disease Control and the Food and Drug Administration estimate that from 6.5 to 33 million Americans become ill each year from microorganisms in their food. According to Vermont State Department of Health epidemiologist, Susan Schoenfeld, there were 323 cases of reported and confirmed food borne illness in 1998 (21 cases of *E. coli*-0157. H7, 144 cases of *Salmonella*, and 158 cases of *Campylobacter*). Vermont does not currently require certification or licensing of food handlers, however there is a national trend towards certification and implementation of food safety systems (such as HACCP - Hazard Analysis Critical Control Points). Food service establishments with high employee turnover and few opportunities for food safety and sanitation education may exacerbate the risk of food borne illness. Specialty food producers and processors often start a business with limited knowledge of the skills or the regulatory requirements needed to insure a safe and wholesome food product. Since 1991, University of Vermont Extension has developed and implemented food safety programs targeted to professional and volunteer food managers and handlers, specialty and home food producers and consumers. In 1998, University of Vermont Extension faculty initiated food safety programs targeted to local fruit and vegetable growers emphasizing good agricultural practices. The majority of the University of Vermont Extension food safety programs are the result of collaborative efforts with other land grant universities, agencies and organizations. Continuation and expansion of this effort will help to reduce the risk of food borne illness in Vermont. As a result of a partnership between the Vermont Department of Education and University of Vermont Extension, 114 food service workers have passed a nationally recognized Food Safety and Sanitation course developed by University of Vermont Extension. In addition to improving the food environment for children in schools, these participants are eligible for promotion and pay raises.

Important research in the area of food safety demonstrated that Vermonters have a strong interest in having food products labeled for genetically modified contents. Studies of maple syrup production continue to check for residues from paraformaldehyde contamination. Although banned, the compound is still used in limited areas. ***Listeria monocytogenes*** is now recognized as a potentially serious health hazard for consumers. Research at Vermont Agricultural Experiment Station is developing improved enumeration procedures that are rapid, sensitive, inclusive, and adaptable for large-scale testing to ensure food safety for ready-to-eat foods, and to assist in making a shift from a zero tolerance policy to a criteria-based policy for Listeria presence in foods.

As biosecurity threats increase, the need for biosecurity training is evident. University of Vermont Extension personnel have produced a biosecurity manual for animal production farmers, and held meetings to advance its use, resulting in the posting of biosecurity-related signs on farm buildings throughout the State of Vermont. During FY2002 University of Vermont Extension expended approximately three FTE's to produce six publications, conduct 71 group presentations, deliver three television segments and four radio broadcasts, and to hold 707 in-person and 917 phone consultations, thereby reaching a total of 548 Vermonters and New

Englanders in programming efforts directed toward improving the safety and security of the food supply.

Key Theme: Food Safety

Improved procedures for enumeration of *L. monocytogenes* in ready-to-eat foods --
Detection of low level and injured *Listeria* in processed ready-to-eat food products is essential to protect public health and ensure food safety. This project seeks to develop improved enumeration procedures that are rapid, sensitive, inclusive, and adaptable for large-scale testing. Analyses of hotdogs show that enrichment in Listeria Repair Broth (LRB) was the only media consistently effective at detecting L. monocytogenes at very low inoculation levels. Sodium nitrite (NaNO2), when present in hot dogs, was found to injure Listeria, thereby masking detection when selective recovery procedures are utilized for detection. Protocols are being established for recovery of low levels of injured cells in food products.

Impact:
Improved enumeration methods will assure continued food safety, and will provide the tools to shift from the current zero-tolerance regulatory policies to a compliance criteria-based system.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

Prospects for Consumer Acceptance of Biotechnology: Research and Communication --
The ESCOP/ECOP report on agricultural biotechnology notes that consumer acceptance of some agricultural biotech products has been poor. They also document a critical need for education and information. This project seeks to answer the following questions: How aware are consumers about agricultural biotechnology? Where are they getting their information? What sources of information are trusted? How is information figuring into their buying decisions? Results of in-depth interviews and a poll of 734 Vermonters indicated that consumers are aware in general about agricultural biotechnology, however, they do not have enough information about it to make meaningful choices in the supermarket. Consumers desire information. Vermonters overwhelmingly support the labeling of food products based on whether or not they contain genetically modified organisms (GMOs). The statewide Vermonter Poll, concluded in early March, 2002, found that 96 percent of Vermont registered voters believe that there should be labels on products stating whether that food item contains GMOs, while only four percent of the population believes that labels are not necessary. Analysis of interview data revealed that only a small segment of consumers is using information about biotechnology to make buying decisions that fit their wants. Results from an earlier poll of 697 Vermonters (FY2000) suggest that the University of Vermont is the most highly trusted source of agricultural information followed by the government (FDA and USDA), the media (print, broadcast, and Internet), and advertising.

Impact:
Information gleaned from low-bias interview and poll samples of Vermonters assists us in shifting program directions and methodologies as needed, and informs agencies and government officials of Vermonter opinions. This information can also be used as a gauge of progress for research and outreach efforts, when comparisons are made between these results and interview and poll results in future years.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

New England Good Agricultural Practices (GAP) project -- The New England Good Agricultural Practices (GAP) project was designed to assess, educate, implement and evaluate GAP principles related to food safety for small farmers in the six New England states. The initial assessment segment of the project, which took place this program year, included two surveys. The first survey asked New England growers about their current on-farm practices, awareness of, and interest in GAP education. The survey asked questions that reflected the areas of food safety concerns found in the GAP guidance - water and water quality, manure and biosolids, field sanitation, worker health and hygiene, sanitary facilities, packing facility sanitation, transportation and traceback. Over 600 farms in the region were randomly surveyed and 296 (47%) were returned. The surveys returned clearly showed that there were many key elements of GAP already in place - particularly in the areas of worker health/hygiene and field sanitation. Fifty percent of farms indicated that they had health and sanitation-training programs in place, and approximately 90% had accessible toilet and hand washing facilities for their workers. In addition, 78% of those surveyed indicated that ill employees were either excluded from work or worked at jobs that do not require contact with food. However, there were indications that implementation of adequate measures to insure water quality and adequate cleaning/sanitation practices may be more limited. While many respondents had already received information about food safety, 87% of those surveyed were interested in learning more about on-farm food safety with over 70% indicating that manure application, personal health/hygiene, use of sanitizers, GAP and microbial hazards all would be very helpful.

A consumer survey was also developed and randomly distributed throughout the six New England states. The main objective of the survey was to evaluate consumers' food safety concerns regarding fruits and vegetables and any preferences for produce that is grown by farms with a GAP program. Of 3,000 New England consumers surveyed, 742 or 24% returned completed questionnaires. Generally, New England consumers (63%) felt that domestically produced fruits and vegetables were safer then imported products. However, only 22% of the respondents indicated that they were completely confident in the safety of fruits and vegetables in the U.S. while 63% were only somewhat confident and 14% were doubtful. In addition, when asked where they thought produce most often became contaminated, 64% of respondents indicated that they thought it would occur prior to being stocked in retail outlets (e.g. on-farm, warehouse and/or during transport - all areas that good agricultural practices and programs would affect). New England consumers (84%) indicated that they would be willing to pay more for fruits and vegetables grown on a GAP certified farm. A third assessment component that took place this program year involved delineation of microbiological flora on selected produce. Volunteer farms, in all states, have already participated in the "pre-GAP" microbiological evaluation. These farmers have committed to the educational programming that will be used to implement GAP principles during the 2002 growing season and "post-GAP" microbiological assessment. Here in Vermont, six growers (one each from Newbury, Fairfax, Essex, Shelburne and Burlington) took part in the microbiological evaluation. Vermont crops sampled included apples, lettuce, and strawberries.

Impact:
The results of the surveys will be used to develop more relevant and useful outreach programs for farmers and consumers, accompanied by practical and achievable on-farm food safety goals for producers. The microbiological baseline evaluations have set the stage for determining the impact of the program as it progresses on those farms adhering to the principles.

This multistate project was funded by Smith-Lever Act funds for the State of Vermont and other New England states.

Key Theme: Food Handling

Raw milk cheese processor safety guidelines and training – The specialty food business (small-scale food business) is a vital part of the Vermont economy. A product having the "Made in Vermont" label sells at typically 15 percent higher than other brands. University of Vermont Extension Faculty working with Northeast Center for Food Entrepreneurship is working with small-scale raw-milk cheese producers to assist them in producing a safe product. The project has two components – a research component investigating processes and temperature requirements that can produce a safe raw-milk cheese product for consumers that is feasible and profitable for producers to implement, and an outreach component that involves developing a peer-reviewed training manuals that meet or exceed all HACCP standards and the offering of regional and state training workshops for cheese producers based on this manual.

Impact:
At this early stage in the project, the research is underway to determine acceptable processing temperatures and handling techniques for producing cheddar and fate cheeses having acceptably low levels of food-borne pathogens. Time temperature parameters for sub-pasteurization have been evaluated using cow's milk, and will be used as guidelines for cow's and goat's milk. Additional literature review will be used to assess the likelihood that other pathogen-based mechanisms that might increase pathogen survivorship or multiplication under these time temperature parameters. These temperature and handling combinations are then to be tested for feasibility by cheese operators, who have been identified. Writers have completed the manual on food safety issues and HACCP for cheesemakers is currently being peer-reviewed. Both Vermont cheese producers and consumers will benefit from the increased product safety and knowledge of the cheesemaking process. Results and outreach efforts are expected to lead to safer raw-milk cheese products, maintenance or increased reputation for Vermont cheese products, and reduced incidence of food borne illness through the ingestion of Vermont-made raw-milk cheeses.

Hatch and Smith Lever funds were used to bring this project to fruition.

Meat processor HACCP plan review – Meat processing has several components, each of which poses risks for introducing agents that may lead to food borne illnesses associated with meat consumption. Meat processing plant HACCP plans in Vermont were reviewed to check for compliance with updated state regulations to increase food safety. The Vermont State Department of Agriculture asked University of Vermont Vermont Agricultural Experiment Station and Extension personnel to review plans for all meat-processing plants overseen by the State, and to make recommendations for changes. All of the state-inspected meat plants in Vermont have been reviewed for HACCP compliance. This included evaluating HACCP and SSOP plans for ten plants, totaling 25 sets of plans.

Impact:
Of the recommendations made by University of Vermont personnel for fifteen plants reviewed, the State implemented the recommended changes for all of them. Changes in HACCP plans

affecting management and food handling practices will increase food safety for people who consume Vermont-processed meats.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont

Key Theme: Food Security

Dairy farm biosecurity management practices -- Biosecurity management practices are lacking on many dairy farms. A manual of biosecurity management measures was produced, and informational meetings were held for farmers.

Impact:
Many questions were answered for farmers, biosecurity signs with instructions are now being posted on barns throughout Vermont, and the Farm Service Agency is using the Biosecurity Management Manual checklist in all of their offices.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Farm Share Food Security Program for Seniors -- The most recent data on Vermonters indicates that the percent of adults who eat at least the recommended two daily servings of fruits is 50% and at least three daily servings of vegetables is 41%. Fruits and vegetables are known to decrease risk for some cancers. Eating locally grown fruits and vegetables also provides the benefit of supporting local farmers, investing in the local economy, and providing the freshest product possible to the consumer. During the summer of 2001, the Senior Farm Share program linked approximately 160 Vermont seniors to local Community Supported Agriculture farms (farms with community connections as a goal) in their communities. Seniors living in subsidized housing were targeted to participate in this program. Each participating Senior received a weekly allotment of fresh produce from the farm. Many of the seniors also had the opportunity to receive nutrition education.

Impact:
Sixty-two seniors completed surveys at the end of the program, describing the benefits they experienced. Senior's responses to four questions on the pre and post surveys relating to food security indicated significant improvements in food security (e.g. In the past three months were there times when the food didn't last and you just didn't have money to get more?; In the past three months did you ever cut the size of your meals or skip meals because there wasn't enough money or food?) Additionally, 88 percent of respondents said they ate more fresh fruits and vegetables during the summer program than usual and 75 percent said they plan to eat more fresh fruits and vegetables all year round. Forty-one percent said they learned a new way to prepare or cook fresh produce and 72 percent said they tried a new kind of fruit or vegetable that they had never tried before. Seventy percent said they were better able to eat balanced meals more regularly, and 56 percent said they worried less about whether food would run out before getting money for more. The four farmers who participated in the program were also surveyed. In addition to the financial benefits they reaped, the farmers got personal satisfaction out of participating. One farmer indicated that it was the "best thing" he and his wife had ever done in their agricultural experience. He described the seniors who participated in his program as being people who had lost everything they had, and were now living in a situation in which they were

unhappy. He felt that through this program, they ended up bonding with one another and cooking with one another in a way that developed a communal atmosphere.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

National Goal Area 3: A healthy, well nourished population

Health care costs in the nation and in Vermont are escalating. Lack of sufficient access to affordable health care means fewer opportunities for prevention. Vermonters are confronted with isolation and gaps in rural delivery systems and a lack of professional expertise. University of Vermont Extension is focusing on prevention and empowering people to practice healthy life styles. It is our expectation that our consumers will adopt healthy lifestyles by reducing high-risk behaviors and taking responsibility for health decisions. Three of the leading causes of death in Vermont, cardiovascular disease, cancer, and diabetes are largely preventable with lifestyle changes. Each year in Vermont, approximately 1,100 people die from some form of cancer, and 1,543 die from heart disease and stroke. An estimated 30,000 Vermonters have diabetes, with about one-third of the cases not yet diagnosed.

Adult obesity (body mass index – BMI - of at least 30) rates in Vermont have increased from ten to nearly eighteen percent since 1991 (CDC Behavioral Risk Factor Surveillance System (BRFSS) 2001). Currently 53 percent of adult Vermonters, or 226,615 adults are over healthy weight (BMI less than 30 but over 25; Healthy Vermonters 2010, Vermont Department of Health). The percentage of obese adults in Vermont has increased 71 percent since 1990. Obese individuals are 40 percent more likely to die at an early age due to increased risk of heart disease. Other obesity associated diseases include type 2 diabetes, high blood pressure, gallbladder disease, joint problems, sleep disturbances, liver disease, menstrual abnormalities, female infertility, and certain cancers including breast prostate and colorectal cancer. Obesity does not affect people in all gender, income and education classes equally. The prevalence of obesity is highest among adults who have some high school or less education (27.7%) and adults age 55 to 64 (22.5%), and lowest among those with incomes over $75,000 (10.9%). More men than women are obese (19.5% v. 16.6%).

Nationwide, childhood obesity rates have increased from eleven to fifteen percent during this same period. A 2001 Vermont Youth Risk Behavior Survey showed that teenage obesity rates ranged from nine to twelve percent, with eighth graders showing the highest obesity rates, and seniors showing the lowest. The same survey, conducted by the Vermont Department of Health, showed that 16% of eight grade students are at risk of becoming obese. Some behaviors contributing to current obesity rates and less healthy youths are diet related. Only 16 percent of teenage students consume three or more servings of vegetables daily, and 41 percent eat two or more fruits or fruit juice a day. Just 27 percent of teenage students eat five or more servings of fruits and vegetables per day. Only 27 percent of students drink three or more glasses of milk daily, with only 20% of female students drinking this much milk. Healthy Vermonter 2010 goals include trying to increase the percentage of teenagers who eat at least two servings of fruit and three servings of vegetables daily.

Vermont Agricultural Experiment Station research and Extension outreach focus on working to improve energy intake and nutrient levels, and dietary choices of higher-risk groups: low-income

adults and families; rural populations, which generally have fewer years of education; seniors; and youth. Extension has not targeted male populations, but has tracked male participation rates. University of Vermont faculty include some of the leading researchers on the issue of obesity. One study showed that using the internet as a communication, information, and support system during weight loss attempts was less effective in sustaining long-term weight loss than face-to-face interventions. Another study showed that for children, the types of foods with added sugars included in children's diets affected the likelihood that their diets met the daily-recommended intake (DRI) for critical shortfall micronutrients such as calcium, folate, and iron. Soft drinks are the number one source of added sugars in youth diets and are displacing the consumption of milk. Results showed that sweetened dairy foods and presweetened cereals had a positive association on measures of diet quality, while sugar-sweetened beverages, sugars and sweets, and sweetened grains had a negative association. Vermont Agricultural Experiment Station research has also found that children who consume flavored milk have higher total milk intakes, calcium intakes, and similar added sugar intakes in comparison with children who are non-consumers of flavored milk. Children who consume flavored milk also consume fewer soft drinks and fruit drinks. Data from these studies imply that children should moderate their intakes of added sugars, while selecting foods and beverages that enhance their diet quality. Other research from Vermont Agricultural Experiment Station shows high correlations between maternal and child milk consumption rates.

Extension outreach programs support and transfer research knowledge to the public. Adult programs aimed at improving diets involve face-to-face learning opportunities and both short and long-term (six months or more) evaluations of behavioral change. Youth-oriented outreach programs focus on gaining knowledge, skills, and novel experiences to improve diets. A gardening program increased skills in gardening, as well as in choosing and preparing healthier snacks. It showed improved knowledge of participants in making food choices that resulted in consumption of a higher quality diet. The program increased the level of experience that youths had in tasting and consuming healthy foods they had never tried before and then decided they liked some of them. A course targeting young populations developed by University of Vermont for use in schools (ages three to eight) called "Food, Fun and Reading," showed that participants increased their experience with trying new and healthy foods. The curriculum is being revised to ensure increased parental involvement as their children progress through the course, and to better measure change in student knowledge and behaviors about how and why they should consume a higher quality diet.

The Vermont elderly are another population at particularly high nutritional risk for a variety of reasons. A 1997 national study found that 8 to 16% of the elder population had experienced food insecurity within a six-month period. A recent evaluation of the elderly Nutrition Program of the Older Americans Act showed that 67 to 88% of participants were at moderate to high nutritional risk. Although the Older Americans Act mandates the provision of two nutrition education units per year per program participant, four of the five Vermont Area Agencies on Aging do not have qualified nutrition professionals for providing nutrition education. University of Vermont Extension has been asked to help address this unmet need. Programs targeting the elderly reached more than 200 Vermont seniors, in addition to a newsletter, Words to the Wise, with a circulation of over 3,500. Introducing educational programs, and computerized and mailed information resources to homebound elders showed marked improvements in food resource management practices, food safety practices, and mean key nutrient intakes. Directly combining research and outreach is a project where Vermont Agricultural Experiment Station researchers

developed a novel approach to delivering nutrition, food safety and health information to Vermont's elderly population. A pilot is underway to determine if the Internet and a specific senior-oriented interactive website are effective modes for seniors to obtain and utilize health information such that they reduce nutritional risks associated with aging.

According to "Healthy Vermonters 2010", one of the most effective ways to improve the health in all age groups of the population is to improve nutrition and physical activity. In fact, consuming a diet low in fat and high in fruits, vegetables, and fiber, participating in regular physical activity, and achieving and maintaining a healthy body weight are all behaviors that would modify Vermonters' risk for developing chronic disease. However, initiating and sustaining behavior change is difficult and requires changing attitudes, acquiring new skills, and gaining knowledge. University of Vermont Extension is in a unique position to help Vermonters achieve these changes. Through practical education, linking diet and physical activity changes to reduced risk of disease, Extension helps Vermonters lead healthier, more productive lives. Eight educational programs, including Dietary Guidelines, Dining with Diabetes, Food, Fun and Reading, Get Engaged in Healthy Aging, Make Nutrition Compute, Making It Fit, reached 3,123 Vermonters, including 275 youths, and more than 400 senior citizens. Results of these programs show that they have served to make a significant impact on human attitudes and behaviors toward nutrition, lifestyles, and meal preparation. The Expanded Food and Nutrition Education Program (EFNEP) and the Food Stamp Nutrition Education Program (FSNEP) help limited resource families in Vermont develop healthier consumer, food preparation, and dietary behaviors. Through long-term, intensive education, EFNEP helps families living in or near poverty to acquire knowledge, skills, and changes in behavior to achieve adequate diets providing normal nutrition. Using the EFNEP model, the FSNEP Make Nutrition Compute (MNC) intervention delivers innovative computer-based nutrition programming to the general food stamp audience. Youth- targeted programs combining nutrition, food preparation and gardening education and experience are also important.

University of Vermont Extension applied 9.4 FTE's toward outreach efforts to increase Vermonter's health and nutrition. During FY2002 Extension personnel conducted 658 group presentations, 1,987 on-site visits, seven television and thirteen radio broadcasts, 541 phone consultations, and 74 Extension office customer meetings, yielding a total of 9,022 contacts.

Key Theme: Human Health

Effect of interview method and interviewer bodyweight on energy intake reporting by women – It is critical to account for the serious and pervasive problem of underreporting in dietary surveys. This study aimed to determine if interviewer body mass index (BMI) or interview method (phone or in-person) affected the accuracy of reports of energy intake by women. Eighty-eight overweight and obese women participated in this study. Subjects completed one telephone-administered multiple-pass 24-hour recall (MP24R) with an unknown interviewer and were then randomly assigned to an in-person MP24R with either a lean or obese interviewer to gather reported energy intake (rEI). Basal metabolic rate (BMR) was measured using a Deltrac monitor, and physical activity (EEPA) was estimated using a Caltrac accelerometer. Therefore, estimated energy expenditure was determined by estTEE = (BMR + EEPA) x 1.10. No significant differences were found between the two in-person interview modes for subject age, weight, body mass index, percentage of body fat, total energy expenditure, rEI, and misreporting of energy intake. In-person recall data were combined for comparison with the

telephone recalls. No significant difference was found between the in-person and telephone recalls for rEI and misreporting. Mean reported energy intake was significantly lower than estimated total energy expenditure for the telephone recalls and combined (lean and obese modes) in-person recalls.

Impact:
This study found that interviewer body mass index had no impact on self-reported energy intake during an in-person MP24R, and that telephone recall data were comparable with in-person recalls. Underreporting was a widespread problem (~ 26%) for all modes in this sample. Information gathered from this work will assist in developing ways to obtain more accurate self-reported information of energy intake by women. The result is that the ability of professionals to appropriately address problems associated with overweight and obese women is improved.

This project was funded by Smith-Lever and Hatch Act funds for the State of Vermont.

Effectiveness of Internet Support as a Nutritional Information Resource for Seniors -- Many older individuals are at increased risk for nutritional deficiencies and food borne illnesses due to various factors associated with aging, including physical disabilities, chronic diseases, social isolation, and sensory losses. The purpose of this research project is to determine if the Internet is an effective way to provide nutrition and health information to the elderly. Research and outreach personnel are presently working on the first phase of this project, which involves the development of an interactive, multimedia, touch screen computer application, designed to collect nutrition and health information as well as deliver nutrition, food safety and health information tailored to the needs of older adults.

Impact:
Elderly Vermonters will have access to this user-friendly Web application via computers placed in selected community senior centers. Outcomes are unavailable, since pilot will take place in FY2003.

This project was funded by Smith-Lever and Hatch Act funds for the State of Vermont.

Effectiveness of Internet support for the maintenance of weight loss -- Maintaining intentional weight loss is problematic for many Americans. This project is designed to determine if the Internet can be used as a vehicle to enhance long-term weight maintenance. After a period of weight loss, 122 subjects were randomly assigned to an Internet site, in-person counseling, or control group. Internet was no more effective than face-to-face contact in promoting weight loss.

Impact:
The negative study results can be used to evaluate future uses of the Internet for health behavior change.

Smith-Lever funds were used in part or in full to develop this project for the State of Vermont.

Solubility and distribution of trace elements -- Poor bioavailability of essential trace elements such as copper, iron, and zinc, in commercial infant formulae is directly related to their low solubility, which may be affected by the forms of added mineral salts. Tests were conducted to

determine whether substituting organic mineral salts increase solubility and, therefore, bioavailability, of minerals in infant formulae. Solubility of trace elements in organic formulae (OF) and inorganic formulae (IF) were compared at different heat levels, mimicking possible heating levels achieved by mothers preparing formula for infants. Heat affected copper levels found in formulae, but were not different between organic and inorganic formulae. Neither heat nor formula type (OF vs IF) affected iron, zinc, or protein levels.

Impact:
Bioavailability of essential minerals is a very important index for making high quality and effective nutritional products (e.g. infant formulae). This study showed that further research is needed to elucidate and verify methods to increase trace mineral solubility in infant formulae. This information is useful for the industry to improve the nutritional quality of infant formulae by ingredient selection and formulation.

This project was funded by Hatch Act funds for the State of Vermont.

The impact of added sugars on the quality of children's diets – Added sugar intakes of U.S. children are rising at an alarming rate. Soft drinks are the number one source of added sugars in children's diets and are displacing the consumption of milk. The purpose of this study is to determine the impact of foods and beverages high in added sugars on the diet quality of U.S. children. Sweetened dairy foods and presweetened cereals had a positive association on measures of diet quality, while sugar-sweetened beverages, sugars and sweets, and sweetened grains had a negative association. Children should moderate their intakes of added sugars, while selecting foods and beverages that enhance their diet quality.

Impact:
Findings from this study are important when establishing nutrition policy for school nutrition programs. Results of this study support the view that maintaining the mandate that milk be served in schools is of utmost importance for the health of children. Equally important are policies that limit sales of and access to soft drinks and other foods and beverages of minimal nutritional value during school meal periods, since these do have a negative impact on children's diet quality.

This project was funded by Hatch Act funds for the State of Vermont.

Key Theme: Human Nutrition

Predictors of milk consumption in U.S. school-aged children: Evidence from USDA nationwide food consumption surveys -- Milk consumption of U.S. children has declined over the past decade. Annual milk consumption has decreased from nearly 35 gallons per year to approximately 28 gallons per year, while children's soft drink consumption has more than doubled since 1960. Today, fruit drink and soft drink consumption by children is more than double that of milk. Yet we know that milk is a nutritious beverage that is comprised of essential vitamins in larger quantities than in most natural foods and nutrients. One eight-ounce glass of milk contains 30 percent of the calcium, 20 percent of the riboflavin, 16 percent of the protein, 13 percent of vitamin B-12, 11 percent of the potassium, 10 percent of the niacin, and eight percent of the magnesium recommended as the daily allowance. Milk producers add vitamin A to reduced-fat milk and vitamin D to all milk to ensure that their customers do not miss these

essential vitamins in their daily diet. While the fat content in whole milk is only 3.25 percent, individuals who prefer lower fat content in their milk, can purchase reduced and nonfat varieties. The vitamins naturally contained in or added to milk are excellent sources for preventing such diseases as beriberi and rickets. The state and federal standards for milk production require an extremely high level of cleanliness. The pasteurization of milk kills pathogenic or disease-producing organisms, and is a significant contributor to ensuring the highest level of quality. The aim of this project was to determine predictors of milk consumption in U.S. school aged children. Results showed that child milk consumption (type and amount) was strongly influenced by maternal milk consumption.

Impact:
The positive association between maternal and child milk consumption should be considered when designing intervention programs aimed at increasing children's milk intake.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

Effects of flavored milk on the quality of children's diets -- Milk consumption has declined at an alarming rate among U.S. school-aged children. The aim of this study is to determine the association between children's flavored milk intake and their diet quality. Children who consume flavored milk have higher total milk intakes, calcium intakes, and similar added sugar intakes when compared with children who do not drink flavored milks. Children who drink flavored milk also consume fewer soft drinks and fruit drinks.

Impact:
These data help to dispel myths surrounding the appropriateness of flavored milk in children's diets and demonstrate that flavored milks are a nutritionally superior beverage choice over other popular non-milk options.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

Expanded Food and Nutrition Education Program -- Although American diets in general are not meeting the recommended dietary guidelines, the average diet quality of people with limited resources is even lower than the general population. The Expanded Food and Nutrition Education Program (EFNEP) is an integral component of NFSH programming efforts. For over 30 years, EFNEP has helped families living in or near poverty - especially those with young children to acquire knowledge, skills, and changes in behavior to achieve adequate diets providing normal nutrition. EFNEP educators, trained paraprofessionals supervised by nutrition professionals, provide in-depth education to adults and youth using a variety of hands-on methods, tailored specifically to meet the needs of limited resource families. Families are offered the opportunity to gain skills in food resource management, nutrition, and food safety practices. Data from a cost benefit study done on EFNEP in Virginia has shown that for every dollar spent on EFNEP, $10.64 is saved in health care costs. In 2002, EFNEP utilized 98 youth and adult volunteers to reach 303 adults and 617 youths.

Adult Audience: Eighty-two percent of participants were enrolled in one or more food assistance programs. Adult females were served for 96 percent of families. Whites comprised 94 percent of adults served, while two percent of the participants were black, one percent were

American Indian, one percent were Hispanic, and one percent were classified as Asian or Pacific Islander. Approximately seventy percent of adult EFNEP participants were between the ages of twenty-one and thirty-nine, and two thirds of participants were from towns of fewer than 10,000 people in areas of the state designated as rural.

Adult education occurred in group (73%), individual (16%), and a combination of group and individual (11%) settings. Fifty-eight percent of participants completed the program, with an average time to completion of 3.1 months. Another 28 percent of participants are currently continuing a program. Of the 14 percent of participants who terminated the program prior to completion, the average length of participation was 2.1 months. The most common reason given for not completing the program (37 percent of 43 respondents) was that they were "no longer interested." The programs yielded participant improvement in several behavioral areas.

Impact for Adult Audience: As a result of participation in EFNEP programs, eighty-one percent of participants showed improvement in one or more food resource management practices. Seventy-seven percent of participants showed improvement in one or more nutrition practices. Fifty percent of participants showed improvement in one or more food safety practices. While just 27 percent of EFNEP participants demonstrated acceptable food resource management practices upon entry to EFNEP, 45 percent demonstrated acceptable practices in this area upon exit from the program. Similar results occurred for nutrition practices, with 26 percent showing acceptable practices upon entry, up to 49 percent upon exit. Two thirds of participants already demonstrated acceptable food safety practices upon entry to EFNEP, and four fifths of participants did so upon exiting the programs. The percent of participants demonstrating acceptable practices in all three of these areas jumped from twelve percent upon entry to 30 percent upon exiting the program.

Youth Audience: Youth addressed through EFNEP programs were primarily white (92%). Five percent of participants were black, one percent were Hispanic, and two percent were classified as Asian or Pacific Islander. Youth came from towns under 10,000 (61%), towns and cities of between 10,000 and 50,000 people (37%), and farms (2%). The greatest proportion of youths participating in EFNEP were between the ages of nine and twelve years of age (39%), with 30 percent of youths aged between six and eight years of age, and 21percent below six years of age. Only nine percent of participants were teenagers. Programs were conducted through organized clubs, short-term special interest programs and day camps, and school enrichment programs. The overnight camps attracted the highest percent of males (53%), while day camps and clubs attracted the highest number and percentage of females.

Impact for Youth Audience: Based on 169 responses, participants were shown to have improved safety practices by more often making sure not to leave meat and dairy out of the refrigerator for more than two hours (22%), and by thawing foods using refrigerator or cooking, rather than leaving out at room temperature (45%). Nutrition practices for EFNEP participants also showed improvement. Most participants (52%) used the "Nutrition Facts" on food labels more often to assist them in making food choices, 36 percent more often thought about healthy food choices when deciding what to feed their families, 30 percent did not add salt to foods they prepared, and 23 percent of families reported that their children ate breakfast more often after exiting the program than when they entered. Thirty seven percent of participants also improved food resource management practices by planning meals in advance more often. Thirty-one percent of participants compared prices more often when shopping, 47 percent used lists when

they went grocery shopping more often than before they had completed the workshops. As a result, 34 percent of respondents stated that they ran out of food before the end of the month less often than before they had completed the workshops.

Programs for youth cover the same basic topics as those for adults, emphasizing improved nutritional, food safety, and food resource management behaviors. This year, the addition of a youth gardening program focusing on these topics assisted us in attracting more youths to nutrition-oriented group educational programs. Since not all areas addressed were surveyed, topics were analyzed by groups, and are reflected in these results. As a result of participating in EFNEP, 72 percent of 25 youths from two groups increased their ability to select low-cost, nutritious foods, while more than two-thirds of 40 youth participants from four groups (68%) increased the variety of foods eaten. Sixty-three percent of 138 youths from two groups increased knowledge about the essentials of human nutrition, and 63 percent of 43 youths from four groups improved practices in food preparation and food safety. University of Vermont Extension will strive to continue and expand our work with this audience who appear to strongly benefit from our resources.

The highest number and percentage of ethnic minority group participants were also found to occur utilizing these latter two delivery methods. While organized clubs attracted twenty people having an ethnic minority status (20%), short-term programs and day camps attracted 27 of these youths (just eight percent). Only two youths classified under an ethnic minority group attended school enrichment programs (1%).

EFNEPP and Smith-Lever funds supported these projects.

Dining with Diabetes -- An estimated 30,000 Vermonters have diabetes. Improved diet and exercise habits have been shown to help control diabetes and reduce complications such as blindness and kidney failure. "Dining with Diabetes", a three-part series of classes designed for diabetics, as well as those who may be at risk of developing diabetes, or prepare food for diabetics, teaches people how to control their blood sugar through diet. The primary goals are to learn how to meet nutritional needs while keeping blood sugar under control, and to try tasty, healthful recipes that can be replicated at home. A follow-up session is held approximately six months after the classes, during which time participants have the opportunity to ask questions, try new recipes, and receive support for changes they have made or are about to make. Dining with Diabetes classes reached 123 food stamp eligible people during FY 2002, falling somewhat short of the goal of 145. Classes were held at eleven sites around the State of Vermont.

Impact:
A post-test and one additional follow-up evaluation survey was administered to low-income seniors who attended the Dining with Diabetes six-month follow-up "reunion" sessions held across the State of Vermont. Evaluation data from these participants indicated that they were applying dietary knowledge and skills they gained from our series to eat in ways that research has shown could lower their health risks. Eighty-eight matched sets of pre- and post-tests were completed by class participants and analyzed for statistical significance. Below we report only those areas for which statistical significant changes were found. Knowledge and attitude changes included:

- an increase in the number of people who understood that milk is a rich sources of carbohydrate (from 23% to 51% of respondents), that apples are a rich source of

carbohydrate (from 27% to 50%), that orange juice is a rich source of carbohydrates (from 39% to 56%), and that sugar is a rich source of carbohydrate (from 42% to 66%);
- an increase in the number of people who understood that using two kinds of artificial sweeteners together would make a product much sweeter than using one alone (from 43% to 81% of respondents); and
- an increase in the number of people who understood that fiber in the diet can help the body get rid of some cholesterol (from 59% to 74%) and can help slow down glucose absorption (from 37% to 57%).
- an increase in participants' knowledge of rich sources of carbohydrates.
- an increase in participants' knowledge of the reasons why fiber is important in the diet: - It helps the body get rid of some of the cholesterol we eat (increase from 59% to 74% of class participants understanding this). - It helps slow down absorption of glucose (increase from 37% to 57% of class participants understanding this).
- a decrease in participants' barriers to using a diabetes meal plan: - Do not know how to get started with a plan (dropped from 25% to 8%). - Not motivated (dropped from 14% to 4%).
- an increase in the likelihood of acting on using artificial sweeteners in desserts
- an increase in the likelihood of using the Nutrition Facts labels to plan healthy meals
- an increased confidence in their ability to prepare healthy meals for someone with diabetes

Trying new, healthy recipes is a good indication of the extent to which participants are engaging in behavior change. Follow-up surveys from 82 respondents showed that the mean number of new recipes tried per person was six, and the mean number of recipes that they would try again, of those that they had already tried, was five. They also indicated that there were a number of other recipes that they intended to try, but they had not, with four being the mean number of recipes they intended to try.

Remarks from participants in Randolph, Vermont, about the program and its value to them were very positive – most people reported that they had made and enjoyed the "diabetes friendly" recipes demonstrated in class a number of times for themselves and their families. One older person who does not cook for himself shared the recipes with a friend who had made some of them for him (this same man reported that he had lost a little weight since the previous session). Several people reported that they were doing a better job of controlling their blood sugar and were eating more healthfully over all as a result of participating in the series. A woman in her eighties who was particularly enthusiastic in her praise for our program stated: "I learned more about managing my diabetes from participating in Dining with Diabetes than I had known in all the fifteen years I've had the disease!"

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Dietary Guidelines – University of Vermont Extension educates the public about the revised Dietary Guidelines for Americans using a newly developed curriculum, a panel display, and the media. The curriculum is a flexible tool that can be used by Extension and other agencies working with limited resource adults (and other audiences) across Vermont. It includes four 15-minute modules. The goal is to increase program participants' understanding of the revised Dietary Guidelines, and by doing so, inspire individuals and families to make changes that support a healthy lifestyle. As requested, University of Vermont Extension is training other agencies to deliver the program, and also provides direct public education using the curriculum.

Additional nutrition and health education/information related to the Dietary Guidelines is delivered through group presentations, the mass media, and individual consultation.

Dietary Guidelines for Americans: ABC'S for Good Health program was offered as a one-hour, 1-1/2 hour, or two-hour program, and was taught to food stamp-eligible Vermonters. Collaborators included community action agencies, family centers, senior meal sites, Agency on Aging, Riverside Life Enrichment Center, Americorps, Head Start programs, health department offices, and other agencies/organizations that provide services to low-income people. The goal of the program is to improve people's food intake so that diets better match the recommendations in the 2000 Dietary Guidelines for Americans. The University of Vermont Extension Dietary Guidelines curriculum emphasizes the three main themes in the dietary guidelines: aim for fitness, build a healthy base and choose sensibly. Examples of topics include attaining a healthy weight, engaging in physical activity, understanding serving sizes, and evaluating a sample menu. A total of 24 workshops were presented at 13 sites in six counties around the state, reaching 369 food stamp-eligible participants. The total number of workshops presented and people reached this year exceeded our targeted number of six workshops to be presented to reach 56 participants.

Impact:
Effectiveness of this program is measured with a pre-and post-written survey completed by participants. Eighty-eight matched sets of surveys were returned. An increased understanding of the dietary guidelines was evidenced by the fact that there was a statistically significant improvement in responses to all of the questions asked. Results showed:

- an increase in the percent of respondents who understood that the food guide pyramid does not illustrate all of the dietary guidelines (from 34% at pre-test to 78% at post-test).
- an increase in the percent of respondents who understood that today's average American diet does not reflect the food guide pyramid (from 66% to 92%).
- an increase in the percent of respondents who better understood serving sizes (from 52% to 94%).
- an increase in the percent of respondents who understood recommended ways to cut back on fat in the diet (from 40% to 77%).
- an increase in the percent of respondents who understood the amount of physical activity that is recommended in the dietary guidelines (from 36% to 64%);
- an increase in the percent of respondents who knew what BMI (body mass index) is (from 66% to 98%).

As part of the post-evaluation survey, participants in the Dietary Guidelines workshops wrote these sample comments (which included indications of intended behavior changes): I will eat better; choose lower fat/sugar/salt choices and add a little more exercise; I will watch and measure my serving sizes; I will include more whole grains in my meals; include exercise each day; I will eat in a more healthier way; include more fruits and vegetables in meals; I will use correct serving amounts - portion control; I will check the nutrition facts food label more when purchasing food; I will offer children more variety and foods that help reduce the risks for chronic diseases; we will re-evaluate our child center nutrition policy and I intend to make the following changes: more exercise! more veggies!; look for "whole" grains; pay attention to "true" serving sizes; ability to identify the amount of physical activity that is recommended in the dietary guidelines; and gained knowledge of the use of the body mass index (BMI) score to determine whether an individual is overweight or obese.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Food, Fun and Reading – The program uses a variety of media, including reading, discussion, take-home worksheets, and hands-on activities to encourage children between the ages of three and eight years of age to develop better eating habits at a young age, including consuming a variety of nutritious foods from all food groups in the food pyramid. A University of Vermont Extension member developed the curriculum materials and evaluation instruments, and to date, 1,214 copies have been sold and used in classrooms in 47 states.

Impact:
Results from surveys show that 89 percent of young participants could identify a variety of nutritious foods and place them in the correct food groups, and 86 percent of children participants tried new foods as part of the program. This coming year, the curriculum is being revised to include more opportunities for parental involvement, feedback and evaluation. Some new methods for evaluating other important outcomes for the young audiences, such as number of nutritious foods tried for the first time or eaten more consistently within food groups, and the number of recipes attempted outside the classroom will be added.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Making It Fit: Piecing Together Your Food Needs
Making it Fit (MIF) is a program designed to teach low-income adults, including seniors, how to eat according to the food guide pyramid while staying within a tight budget. Four Making it Fit classes took place the first quarter, five classes took place the second quarter, and two classes were held in the third quarter. Eleven courses taught at nine different sites throughout the state reached 123 participants, surpassing our goal of 106 participants.

Impact:
Effectiveness of this program is measured with a pre- and post- written survey of participants. Sixty-five matched pairs of surveys were completed. Based on information gleaned at entry and exit to classes:

- 19 percent more MIF participants regularly eat more than one kind of vegetable a day
- 8 percent more MIF participants regularly eat more than one kind of fruit daily
- 19 percent more MIF participants regularly read nutrition facts labels at the store
- participants increased knowledge about the number of recommended servings in the food guide pyramid in three categories. The percent of respondents correctly stating the number of recommended servings in the dairy group increased from 47%% to 72%. The percent of respondents correctly stating the number of recommended servings in the grain group increased from 34% to 75%. The percent of respondents correctly stating the number of recommended servings in the fruit group increased from 64% to 88%. Although there were improvements identified in the other two food groups, they did not achieve statistical significance.

When asked if they had any additional comments, the following noteworthy statements were made:

- "The recipes were a great way to try healthy food I would have never chosen"
- "I truly enjoyed eating healthier"

- "I loved the class and I enjoy learning more on the food groups and will start to look at what's good for me, and how to buy good healthy food. Thanks a lot, enjoyed the class very much."
- "I would advise anyone to take this program."
- "More elderly need this…"

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

4-H Growing Connections – Research shows that 75% of youth do not eat recommended servings of fruits and vegetables, and that youth from families with low incomes are particularly susceptible to poor nutrition. Research also shows that youth are more likely to eat high fiber and nutritious foods when they are engaged in hands-on experiential activities growing and preparing foods. The 4-H Growing Connections Program is a hands-on nutrition and gardening program for youth that includes developing nutrition and cooking skills, planning and planting a garden, building food security and hunger awareness, increasing safe food preparation skills, practice at selecting nutritious and good tasting foods, and enhancing food safety and preservation skills. University of Vermont researchers and Extension outreach personnel designed the curriculum and evaluation to target an underserved population group, low-income youth. Through observing and modeling one another, setting and monitoring goals, and receiving recognition, youth were able to build confidence in their abilities to make healthy life style choices and increase their ability to produce and/or access safe, nutritious food.

During the first half of the year specific accomplishments in the areas of planning, coordinating, and program development were completed. These included facilitating the efforts of a interdisciplinary/statewide team of University of Vermont Extension staff and faculty; developing a brochure to promote the program and recruit participants; developing a statewide program model, curriculum, and evaluation tools; and developing two "Green Scene Newsletters" for youth. In addition, networks were developed with cooperating organizations and site locations identified for program delivery; extramural funding was sought and accessed; volunteers recruited; and a statewide public relations information campaign was delivered via the media including one Across the Fence Show and three radio shows.

During the third quarter, the actual hands-on work with youth took place. A total of 426 low-income youth between the ages of 5 and18 attended at least one session in the program that emphasized between two and three core learning topics. Approximately 160 youth received a more in-depth experience by attending a consecutive series of classes (ranging from 2-7 classes in the series). The program was delivered at 20 sites in 13 of the 14 counties in the State of Vermont. Sites included schools, youth centers, summer camps, housing communities, and other community sites serving low-income youth. At 15 of the 20 sites, youth received a free lunch as part of the Summer Food Service Program.

Impact:
- 324 (76%) youth actively participated in growing vegetables in a group or container garden.
- 346 (81%) youth demonstrated an increased ability to prepare a meal with fresh produce.
- 334 (78%) youth increased the range of fresh produce they were willing to taste.
- 267 (63%) youth demonstrated an increased skill in the safe handling and preparation of food.
- 84 (20%) youth intended to increase their consumption of fruits and vegetables at home.

- 80 (19%) youth actively participated in community service by donating produce from the garden to a local food shelf.
- 72 (17%) youth demonstrated an increased skill in proper techniques for food preservation.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Make Nutrition Compute -- Through use of laptop computers in the home, nutrition educators used a nutrition curriculum that is designed to be interactive, and specifically targeted to individuals and families with limited resources. In this fifth year of the program, four nutrition educators located in four counties of the state used the *Pyramid Challenge* and *Pyramid Explorer* computer programs to work with 49 low-income adults in their homes.

Of the 49 participants, 44 were enrolled in Make Nutrition Compute in FY'02 and five were participants who were enrolled in FY'01 but received part of their lessons in FY'02. Program graduates received an average of ten lessons. Of the 49 participants, four did not graduate from the program due to loss of contact or family concerns. Forty-four participants were White, one was Black, one was Native American, two were Hispanic, and one was Asian or Pacific Islander. Forty-six participants were female and three were male.

Impact:
We have dietary intake data on 42 participants that show the following self-reported improvements based on entry and exit survey data:
- 86% of participants reporting an increase in eating the number of recommended servings from any of the five food groups
- participants reporting eating the recommended 6-11 servings from the grain group increased from 26% to 48%
- participants reporting eating 2 or more servings from the fruit group increased from 31% to 45%
- participants reporting eating 3 or more servings from the vegetable group increased from 41% to 48%
- participants reporting eating less than 2 servings from the dairy decreased from 62% to 52%
- participants reporting eating at least the minimum number of servings from each of the food groups increased fro 0% to 5%
- participants reporting eating 25 or more grams of dietary fiber increased from 2% to 17%
- participants reporting receiving less than the Recommended Dietary Allowance (RDA) for protein decreased from 38% to 22%
- participants reporting receiving less than the RDA for calcium decreased from 71% to 62%

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Get Engaged in Healthy Aging project -- Nutritionally at-risk elders receiving home-delivered meals and people with limited resources may lack access to nutrition education. This project provided nutrition education to 15 at-risk elders in their homes using laptop computers.

Impact:
Program results showed at-risk elderly participants made improvements in one or more of the following food practices: food resource management practices (64%), food safety practices (50%); nutrition practices (100%). Mean nutrient intakes that were measured for at-risk elderly

participants improved for protein, iron, calcium, vitamin C, and vitamin B-6. At-risk elderly participants also increased their intake of the recommended servings from the five food groups.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

National Goal Area 4: Achieve greater harmony between agriculture and the environment.

Small densely populated communities surrounded by working agricultural landscapes and diverse forestlands characterize the scenic quality of Vermont's environment. In addition to providing quality habitat for Vermont's wildlife, much of these woodlands support recreation, tourism, and wood products industries that contribute significantly to the state's economy. The most pressing concerns of Vermonters are the economy, jobs, and land use leading to sprawl, loss of agriculturally productive lands, and deterioration in air and water quality (Vermonter Poll 2002). Clearly, economic opportunities that are compatible with environmental stewardship and conservation of natural resources are needed throughout the state.

Water quality issues in Vermont, the Northeast Region, and nationally are front-page stories. Storm water runoff is contaminating streams, rivers, ponds, and lakes. Additional development may be curtailed until water quality standards can be met. Summer beach closures threaten the quality of life and tourism development. Failed or failing septic systems, particularly along shorelines have resulted in increased water pollution. In addition, private well water supplies are at increased risk due to both a long-term drought and land use activities. Failed septic systems, land use practices and risky disposal practices of household, business and industrial wastes pose risks to private water supply systems.

Excess phosphorus is the primary cause of impaired water quality in Lake Champlain. Dairy farms are considered a large source of phosphorus. Meanwhile, many farmers are struggling on the brink of unprofitability, and making choices between environmental benefits and economic costs poses a dilemma for farmers and policy makers. Vermont's farmers, in partnership with state and federal agencies, have invested millions of dollar in environmental conservation measures to control runoff, create buffer strips and drastically reduce the amount of phosphorus flowing into the state's waterways. Environmentalists advocate for agricultural land use because an acre of agricultural land has far less impact on the environment than an acre of commercial or residential land.

A strong link between research and outreach is working to reduce the impact farmers have on phosphorus runoff into streams and lakes. University of Vermont is building models to enhance water quality while sustaining farm profitability by evaluating farm-level financial costs and environmental benefits associated with implementing alternative farm practices to achieve phosphorus reduction. Research on soil factors influencing phosphorus availability to plants and concentrations in runoff, comparisons of low-phosphorus and conventional feeds, and the development of an index and easy-to-use device to determine the likely concentrations of phosphorus runoff from farms provides useful information and tools for outreach. Outreach is focusing on increasing the number of farmers applying computer software designed to incorporate low-phosphorus strategies with other management strategies to maintain or increase profits while reducing phosphorus runoff.

These strategies have been combined with a focus on educating youth using clubs and teacher's classrooms. The study of watershed function, phosphorus detection, and management approaches to improve water quality in natural waterways are the major themes of these youth efforts. Recent evaluations point out that educational programming in Vermont schools regarding natural resources and the environment is inadequate. Many science disciplines are still being taught in an isolated manner because teachers currently do not have the resources or support to incorporate environmental education into their curricula. Non-classroom education faces the same problems. Water quality issues affecting local communities, are part of a hands-on, experiential curriculum developed and used with youth in many Vermont communities. The issues discussed include the effect of storm water runoff, failed septic systems; household and business waste disposal practices on natural water sources that can result in such things as contaminated private and public water supplies or beach closures that threaten quality of life and tourism development. Students produce projects and, in many cases, share information gleaned about local waterways with local officials.

University of Vermont Extension also provides demonstrations for residential neighborhood groups and commercial property owners on low-input lawn care, gardening, and waste elimination. Due to water quality concerns at a popular residential and summer vacation area along Lake Champlain, University of Vermont Extension is working with the Town of Colchester to facilitate a community-visioning program designed to address economic and social issues influencing water quality in Malletts Bay. University of Vermont's roles include developing baseline data through research endeavors as well as helping the committee to develop cooperators and resources to carry out tasks deemed critical to goal achievement. Much work focuses on septic system quality, and new rules passed by the Vermont legislature earlier in the year have led to the need to expend more energy in informing residents of new septic options available to them, and new compliance requirements. Additional work includes working with teachers to assist schools in implementing water quality-oriented curricula, and one-week summer camps for youth to learn about water quality issues.

In Vermont, there are over 80,000 drilled wells and an unknown, but perhaps equal number of dug wells, springs, and ponds used for private water supplies. Private wells are not required by law to be tested for bacteria, chemicals or radioactive substances. Many people relying on these water sources may be at risk of exposure to unsafe levels of contaminants in their drinking water. University of Vermont Extension is working with the Environmental Protection Agency and other New England states to develop a New England wise curriculum to assist people relying on private wells for their water. Extension personnel produced several television broadcasts targeting rural and elderly audiences to encourage annual well-water testing. This public education is combined with Realtor and Town Health Officer education programs to increase the number of wells tested annually. An unanticipated drought caused Extension to respond to more than twenty requests for assistance from well-water users who were out of water during critical farming periods, putting animals and humans at risk.

Another challenge is to sustain the health of the forest ecosystems, water quality and wildlife while also sustaining the economic health of forest industry and the rural communities that depend on them. With over 80 percent of Vermont covered by forests, Vermont ranks third in the nation in terms of percent of forestland. Eighty-three percent of this land is privately owned and managed with a wide range of landowner objectives. The largest amount of privately owned forestland is held by individuals whose goals may be clearly articulated as wanting them for

income or recreation or as general as just wanting to own a piece of forestland. This privately held resource base provides the wildlife habitat, air and water quality protection, and the recreational opportunities for Vermont residents and the visitors to Vermont. In addition, these private woodland owners provide the wood products industry with the raw material to support almost one-fifth of Vermont's total manufacturing labor force.

Vermont forest landowners and forest products industry are a vital component of the economy in our rural communities, providing raw materials and over 10,000 jobs. Yet their contributions and potential are often unrecognized and under-appreciated. There are 65,000 woodland owners, approximately 600 full-time logging contractors, 120 consulting foresters and as many as 200 stumpage buyers in Vermont. In data released in 1997 by the State of Vermont shows, the forest products sector recently became the largest contributor to the manufacturing sector in the state, even exceeding electronics. Forest Products pays approximately $138,000,000 in total wages. Total value of shipments of forest products was an estimated $1.9 billion in 2001.

Working with Northeast Kingdom professionals, who were especially hard-hit this past year with factory and timber-related closures, University of Vermont assisted in the development of economically feasible and sustainable forest products enterprises.

Woodland owners want to know more about long-term forest management opportunities and ways to protect their forest ecosystems. Foresters want to learn about the approaches to managing whole ecosystems and the product certification standards that are increasingly common in the region. Loggers want to learn more about better managing the impacts of timber harvesting to protect soils and other ecosystem values and communicating effectively with clients about the importance of good forest management. Stumpage buyers need current and reliable information on the dynamics of stumpage prices and the impacts of market decisions on successful forestry.

Important to forest-based rural development is the fact that many of the higher producing sectors such as electronics or health services tend to be concentrated in a few geographic regions while forest product jobs are widely scattered in communities throughout the state. University of Vermont Extension program activities provide information and education to people who are presently involved in, or have an interest in wood products production and marketing businesses and to loggers, truckers and woodlot owners in need of alternative wood markets. Program emphases included value-added wood products production and marketing opportunities that encourage sustainable forest management and sustainable economic development in Vermont rural communities. Special efforts were directed toward helping to maintain and increase forest products employment and small forest products business survival during a serious economic recession within the industry.

A special program also focused on identifying economically feasible small-to-medium- scale forest products enterprises and encouraging them to develop within the communities of the Northeast Kingdom. Program efforts also included addressing the challenges and opportunities of home-based business, e-commerce, wood craftspeople and connections with regional Northeast Kingdom tourism markets. Planned program activities also resulted in identifying sustainable opportunities for diversifying forest products markets for Vermont forest landowners, with particular emphasis on the Northeast region of Vermont.

Economic needs, of course, must be addressed in concert with the demand for other, less tangible products from Vermont's land base, such as recreation, aesthetics, ecosystem management and protection of water resources. In collaboration with existing partners and in cooperation with new partners, University of Vermont Extension faculty provide leadership to help Vermonter's solve problems to ensure the economic sustainability and ecological integrity of Vermont's valuable natural resources.

Pest management is another area of concern for Vermont Agricultural Experiment Station and University of Vermont Extension. Vermont Agricultural Experiment Station is developing new methods allowing us to begin to quantify ecological impacts of biological control programs. Vermont Agricultural Experiment Station and University of Vermont Extension have also focused on reducing pesticide use while increasing profits for industries vulnerable to pest infestations, such as apples and greenhouse growers.

FUTURE:
The travel and tourism industry in Vermont is growing rapidly and may soon become the largest industry in Vermont if trends continue (Albers 2000). This rapid growth provides both challenges and opportunities. Farm and nature tourism and recreation, in particular, provide an opportunity to promote conservation in harmony with sustainable development. New regulations that passed legislation in Vermont this past year permit alternatives to current septic system rules. The rules also expand to new groups the need to develop acceptable septic systems and water treatment strategies. As understanding of hydrogeomorphology improves, VT-AES and UVM Extension will play a role in articulating this information and educating the public about the impacts of this knowledge on land use planning.

Key Theme: Wetlands Restoration and Protection

Importance of genotypic versus environmental factors in the invasiveness of *Phalaris arundinacea* – Invasive grasses are altering ecosystems around the world. *Phalaris arundinacea* is a reed canary grass that is planted as a forage crop in North America; however, it has also migrated into wetland areas where it is unwanted. This project studied the relative importance of genetic versus environmental factors in limiting the distribution of this invasive species. Results indicate that genetic factors are as important as environmental factors in predicting the spread of *Phalaris arundinacea*. Species that become invasive after being introduced into a new area often experience genetic bottlenecks and strong selection to adapt to their new environment. Further study looked for evidence of such processes in unmanaged populations of the invasive reed canary grass. Comparisons of isozyme variation in pasture and wetland populations of the species did not find any indications of genetic bottlenecks: wetland populations comprised as much diversity as pasture populations and both had as much diversity as the two cultivated varieties sampled. Further comparisons of plants cultivated from unmanaged wetland and pasture populations to estimate genetic variance for several morphological traits revealed no significant differentiation to suggest differential selection between populations from the two habitats. The highest levels of genetic diversity, both isozymic and quantitative, were found within populations.

Impact:
Results suggest that the introduction of new genotypes should be prevented. Additional results from the analyses will be used to determine whether there is a difference in invasive

competitiveness among genotypes.

This project was funded by Hatch Act funds for the State of Vermont.

Key Theme: Natural Resources Management

The 2002 Vermont Wilderness Poll -- Public opinion can be instrumental for government decisions regarding the use and management of public lands. The purpose of this survey was to obtain Vermonters' opinions on issues relevant to the use of public lands in the state, particularly the issue of federal wilderness designation in the Green Mountain National Forest. 589 responses were solicited in a full statewide sample and a smaller sample of 43 towns in or near the Green Mountain National Forest. The majority of responses were supportive of more wilderness designation in Vermont.

Impact:
This survey added to the knowledge base of public opinion regarding wilderness designation and the use of public lands.

This project was funded by Smith-Lever funds for the State of Vermont.

Key Theme: Invasive Species

Novel approach for developing PDE (partial-differential equation) models of the spread of invasive species -- The State of Vermont indicates that areas of Vermont are in poor health due to invasive species. A tool that can provide managers with the ability to predict where their control efforts should be concentrated is a mathematical model. Over the past eighteen months, Vermont Agricultural Experiment Station has been designing and evaluating a new approach that uses evolutionary computation for developing better models for predicting the speed of the spread of invasive species. Results show that developing better ecological simulation models of invasive species is feasible with this approach. Software development is nearly complete, with the following components having been internally and externally validated using certain models: the graphical-user interface (GUI) that links to a genetic algorithm library; the fitness function that incorporates the Aikaike Information Criterion for model selection parsimony; and the data analysis tools. The user can set genetic algorithm parameters (population size, selective pressure, number of iterations, mutation rate, etc.), launch the search for the best model fit, visualize progress in a window within the GUI in either 2D or 3D graphical form, write out results directly to an Excel spreadsheet, and if desired the search can be paused to change parameters and restart the search, without the need for recompiling.

Impact:
The software system has been successfully tested on a nested suite of polynomial models and on a more complex ecological simulation. In both cases, the evolutionary approach successfully selected the correct model and appropriately fit parameters. Recent improvements include the incorporation of a partial-differential equation (PDE) solver for the suite of invasive species models, which led to a successful fit of a test data set of invasive species dynamics. Over the next six months the remaining extensions to the suite of PDE invasive species models (short and long distance dispersal, habitat heterogeneity) should be completed and tested, and then field-

testing the software will begin. This project will benefit environmental managers by providing better predictions of invasive species dynamics for directing control efforts.

This project was funded by Hatch Act funds for the State of Vermont.

Key Theme: Water Quality

Soil and Site Characteristics Influencing Phosphorus Loss to Runoff -- Phosphorus (P) in runoff from agricultural fields contributes to water quality problems in lakes and streams. This project is examining the effect of soil properties on phosphorus in runoff and finding the best chemical test to predict algae growth from runoff P. Results will be used to improve the P-Index for VT. Development of a research-based P-Index will improve water quality by focusing treatment efforts on problem fields, while allowing farmers more flexibility in management. In general, runoff water from soils with higher soil test phosphorus has higher concentrations of dissolved P. Other factors (such as the degree of contact between runoff water and soil) may explain some of the differences between soils in level of dissolved phosphorus in runoff water. A series of laboratory and field experiments indicated that soil phosphorus extracted by the modified Morgan Solution (ammonium acetate at pH 4.6) is a good predictor of phosphorus availability to crops. Tests also showed that as the aluminum (Al) content increases, higher levels of extractable phosphorus are needed to provide a given level of plant-available phosphorus. A survey of dairy farms found that a) most farmers are feeding phosphorus to dairy cows at levels significantly higher than needed; b) estimated net annual import of phosphorus onto farms was related to the number of animal units per hectare, the fraction of land in corn production, and whether rotational grazing was used during the field season; c) average soil test phosphorus levels correlated well with estimated net annual phosphorus import levels.

Impact:
Tests have provided information needed to improve the accuracy of soil-based recommendations for the use of phosphorus fertilizers and manures, as well as to decrease the amount of phosphorus fed to dairy cows. These improvements over the long run should reduce the amount of phosphorus from agricultural sources reaching surface waters of Vermont.

This project was funded by Hatch Act funds for the State of Vermont.

Balancing economic and environmental impacts of phosphorus management --
Potential pollution runoff from dairy farms is a primary concern for management of the Lake Champlain Watershed. An increasing number of farmers are interested in and required to document their efforts targeted to reducing the environmental risks posed by their farms in order to maintain their status as USDA participants. Vermont Agricultural Experiment Station and University of Vermont Extension have worked together to:
1) develop a phosphorus index (P-index) for Vermont farmers to use in nutrient management planning to determine P runoff potential from farm fields;
2) collaborate with Penn State University to update software (Crop MD) that uses soil test values, manure test values, animal unit descriptions, and intended cropping practices to help farmers develop farm- and field-specific nutrient management plans to reduce non-point-source pollution from livestock waste;
3) demonstrate to farmers and agribusiness representatives how an effective Comprehensive Nutrient Management Plan (CNMP) can be an effective tool for farm management decisions to

increase or maintain profits while reducing negative impacts on waterways.

Impact:
Since FY2001:
1) the original Vermont P-index has been used in nutrient management planning on a number of farms, but is now undergoing evaluation and revision to incorporate current research and other information; 172 users in 2002 reported gains in knowledge about the use and efficacy of the P-index;
2) CropMD2v1_VT software has been revised twice (to version 3); 290 users have been trained in using the software (and have copies of the software); 116 agency personnel are trained and certified to interpret the summary output submitted to the Natural Resource Conservation Service (NRCS) / Farm Service Agency (FSA) for evidence of program participation compliance; 101 farmers have developed nutrient management plans using the software to mange nutrient loads on the farm; and
3) 210 farmers, consultants, industry representatives and agency personnel using three demonstration farms have attended education programs regarding the development of Comprehensive Nutrient Management Plans (CNMPs). Seventy-five percent of participants reported that the programs gave them "a good understanding of the components of nutrient management planning." This year a dairy farmer applied for cost-share assistance through FSA and NRCS to improve farmstead and field practices, including manure storage and handling systems, Farmstead BMPs, crop management and record keeping. The farmer's existing conditions were measured and inputted into the CropMDv3 software to compile a complete set of conformance records for the farmer to use. He used the records and management plan to demonstrate advances in nutrient management practices on his farm. He received a $4,000 incentive payment for his efforts to protect the environment. Three farmers in northeastern Vermont implemented changes in corn crop management practices to include an inter-seeding practice, recommended through nutrient management plan consultations. All saw returns to higher productivity this year using this method, which improves soil properties without the addition of fertilizers or nutrients.

This project was funded by Hatch and Smith-Lever Act funds for the State of Vermont.

Watershed Alliance -- Educational programming for Vermont youth regarding natural resources and the environment is inadequate. Many science disciplines are still being taught in an isolated manner, in part due to a lack of resources and support for teachers and facilitators to incorporate environmental education into their curricula. The University of Vermont Watershed Alliance, a program shared by University of Vermont Extension, Lake Champlain Sea Grant and the University of Vermont School of Natural Resources, provides schools and educational youth organizations with the necessary support and resources, including expertise, curricula, models, water quality testing equipment, and technical support. This cooperative effort makes it possible for students throughout Vermont to bring classrooms outdoors and learn about the watershed in which they live, and communicates to Vermont youth the shared responsibility humans have in protecting our watersheds and preventing water pollution. Students "adopt" a portion of their watershed, collecting, monitoring and analyzing water quality data, and make water quality-related recommendations to their local officials and community members based on their findings. In this way, the Watershed Alliance empowers youth to take action to conserve and protect water resources by enabling them to see that humans are not only part of the problem, but are also part

of the solution. Measures collected include phosphorus levels, dissolved oxygen, pH, temperature, conductivity, benthic macroinvertebrate frequencies, and *E. coli* concentrations.

The program has been implemented in schools within ten of the 17 major watersheds of Vermont. Undergraduate students studying water resource management at the University of Vermont serve as interns, ensuring consistent methodologies and accurate results for compiled data. Students review monitoring protocols and safety procedures, learn about watershed ecology concepts using interactive models, collect water samples for analysis of physical and biological characteristics, and verify results of their analyses by working with technical specialists at a professional laboratory, prior to sharing recommendations with the public.

Impact:
The Watershed Alliance program has now reached over 480 students, a substantial increase from last year. All but one school participating last year returned to continue the program this year. The program added three new schools in three new watersheds this past year, so that now, ten of the seventeen watersheds identified for Vermont have data being collected for them. The number of University of Vermont students in the School of Natural Resources that are working with the Watershed Alliance has more than doubled from four in 2001 to eleven in 2002. Results have led to two river clean-ups and one town choosing to boil water for a period in response to results obtained from student measures of chemicals and bacteria in the town's water source.

Data collected in partnership with the New England Interstate Water Pollution Control Commission, the Vermont Natural Resource Council, the Upward Bound Program, Harwood Union High School students, and Friends of the Mad River, will be presented by students to the Vermont Water Resources Board in an attempt to reclassify a little-known wetland. Reclassifying the wetland would increase its protection status. Many forested wetlands are not considered significant according to current state statutes, which may have more to do with the classification system than an informed evaluation of the wetland itself. With more than half of Vermont's wetlands being forested wetlands, a significant difference in wetland habitat protection can be made through monitoring and reclassification efforts.

Quotes from students who participated in the program attributed its value to its "real life" and local utility, "unlike many science experiments…. done before." Another unanticipated outcome of the program has been the knowledge shared between students and farmers who permit access to waterways through their land. Students have been surprised and impressed with how much effort some farmers expend toward reducing the impacts of their operations on water quality in the waterways surrounding them.

New funding for the Watershed Alliance is expanding measures to include the presence of pharmaceuticals in surface, waste, and drinking water. These have been monitored in areas of Europe for some time, but have been measured for very few waterways in the U.S. Future goals of the Watershed Alliance include having at least one school or youth group collecting annual data in each of the 17 major watersheds, as defined by the State of Vermont. This would translate into reaching more than 1,000 Vermont students with the water-monitoring program. The group is also working on the development of a central web-accessible database for collecting data, making it accessible to federal, state, and other organizations, such as citizen monitoring groups who may use the data for decision-making.

This project was funded by Smith-Lever Act funds for the State of Vermont.

Youth gardening for water quality and conservation – Lawn and garden -related sources of nutrients are large contributors to pollutants impairing coastal water quality in Lake Champlain, particularly important during years of drought. Youth living in lakeside areas show low awareness of the impacts of household actions on water quality. Youth were taught to understand the connection between gardening practices and water quality by developing skills to protect and conserve water resources in gardens they helped to grow, and were encouraged to transfer new knowledge and gardening practices to their own home gardens. The beginner, intermediate and advanced water quality curriculum modules were developed and piloted here in Vermont in 2001. Fifteen educators were then trained in how to teach the curriculum. The educators reached 108 youth during three mini-workshops, which emphasized implementation of gardening strategies to protect water quality by minimizing the use of chemical fertilizers or pesticides, and by adopting organic gardening methods. Additionally, 36 youth gardeners exhibited their produce in one of several midsummer events that emphasized water quality and conservation. One of the events at a local farmers' market included a "Water Quality Scavenger Hunt" in which youth interviewed farmers about ways in which they protect water quality.

Impact:
Of 108 gardening participants, 63 completed an evaluation form. Sixty-six percent of these respondents demonstrated an increased understanding of water quality issues. Fifty-four participants actively participated in four to eight hours of educational activities. Parents of 39 of these youths completed a survey about strategies being implemented in home gardens. The surveys showed that all respondents implemented one or more strategies to conserve or protect water resources -- 92 percent of respondents implemented one or more skills learned to protect water quality, and 95 percent of respondents implemented one or more skills learned to conserve water. Most notably, 90 percent of youth and parent respondents stated that they use little or no chemical fertilizers or pesticides in their gardens as part of their commitment to protecting water resources. Additionally, 21 volunteers visited 25 youth gardeners to offer advice emphasizing water quality and conservation strategies. They each commented during a training session that they themselves had learned at least one new water quality strategy that they could implement in the garden. Parents of youth participants stated that water conservation strategies were particularly useful, as a drought had been experienced the previous year.

This project was funded by Smith-Lever Act funds for the State of Vermont.

Englesby Brook restoration -- Domestic (lawn, garden, pet waste) sources of nutrients and other contaminants are an important source of pollutants impairing coastal water quality in Lake Champlain. Most homeowners are not aware of the issue and of their potential contributions to both problem and solution. Englesby Brook water quality and quantity have been the focus of concern for neighbors, the city and major landowners in the watershed for a long time. Funding was recently received for large-scale restoration of the Brook to improve water quality, reduce erosion and water damage. One of the first structural improvements, a series of stormwater retention ponds, was planned for the Burlington Country Club (BCC). However, neighbors were not consulted in the design or planning of any of the restoration activities, even though water flows and water quality downstream of the improvements would be significantly affected. This project has brought the neighbors together to inform them of what the key issues are, helped

them to develop their positions, and prepared them to participate in the design and negotiate with the BCC and Burlington Public Works (BPW) department to have the restoration meet local neighborhood needs, as well as the engineering and irrigation needs of BPW and BCC, respectively. Burlington Country Club, Burlington Public Works and Englesby neighbors have met twelve times to outline their positions, and to review and revise the storm water management structure now under construction on BCC grounds. Water quality and water flow issues and concerns were articulated and discussed in these planning meetings and mutually acceptable positions negotiated, with the flow conditions desired by the neighbors explicitly included as design and operational requirements in city permits. A watershed newsletter has been developed and distributed to all water customers in the watershed (750 properties). Information programs have been delivered to neighbors in Burlington Wards 5 and 6 via NPA meetings and other hearings. Englesby neighbors have been organized and prepared to successfully negotiate brook flows with BCC and BPW as part of the brook restoration program. The University of Vermont Extension Master Gardener program has set up six demonstration sites in Burlington Wards 5 and 6 to demonstrate lake friendly lawn/garden techniques to neighbors. The Master Gardener program has established a Master Gardener Day once a month during the outdoor growing season to inform and educate gardeners living near Lake Champlain about low- input and organic lake friendly gardening techniques, and they are available to answer questions.

Impact:
Burlington Community Gardens located in lake buffer areas have adopted a policy of low input/organic for all plots. Champlain Garden (on the banks of Englesby Brook) will become an all-organic garden as of this season. Burlington Country Club has agreed to adopt lake friendly practices to protect water quality in Englesby Brook. Burlington School District will maintain the property with no fertilizers or other inputs, and maintain a vegetative buffer for the brook.

This project was funded by Smith-Lever Act funds for the State of Vermont.

Key Theme: Integrated Pest Management

Factors affecting the efficacy of mycopathogens in greenhouse pest management – In any IPM program, it is essential that the different components are compatible. Many plants are known to produce anti-microbial compounds that might negatively affect fungal activity. Knowledge on the effects of host plants on insect susceptibility to fungi is therefore important, and may be used to predict whether mycopathogens can be successfully used on certain crops. However, the role of the host plant in affecting the activity of insect-killing fungi has rarely been investigated. This study assessed the effects of two commercially important host plants (poinsettia and tomatoes) on the infection of silverleaf whitefly by the commercial fungal product, BotaniGard. Because this piercing-sucking insect is closely associated with the leaf surface, it is directly influenced by volatiles and exudates produced there. Variety of poinsettia was found to influence the survival of fungal inocula on leaf surface over time. The lowest rates of poinsettia infection corresponded with the poorest levels of conidial survival. On poinsettia, B. *bassiana* conidia were very compatible with all insecticides tested. However, it was found that applying fungi and biorational pesticides simultaneously might not enhance overall efficacy.

Impact:
This study found that using fungi together with selected biorational insecticides has the potential to enhance the efficacy of a bio-based control program. Insect-killing fungi are compatible with

a range of biorational pesticides, but applications of fungi and biorational pesticides together versus in a spray rotation may not significantly affect the level of pest control achieved. This knowledge can assist greenhouse growers to improve their plant growth success using IPM strategies.

This project was funded by Hatch Act funds for the State of Vermont.

Management of tarnished plant bug with entomopathogenic fungi – Tarnished plant bug is the number one insect pest of vegetables and small fruits in Vermont. The high level of susceptibility of tarnished plant bug to certain strains of entomopathogenic fungi suggests thy have high potential for development as biological control agents. Experimentation on the mass production, formulation and field efficacy are ongoing. Through efficacy trials of one product, a leaf damage rating system with grower input was further developed. The use of corn as a growth medium has dramatically reduced production costs. The initial field evaluation of formulations identified in laboratory trials is near completion.

Impact:
Effective biological control of this pest will open up new opportunities for organic farming markets. The technique researchers developed for mass production of entomopathogenic fungi allows quantities of spores sufficient for small scale field testing to be produced at minimal costs. This will facilitate expansion of testing experimental fungi under field conditions.

This project was funded by Hatch Act funds for the State of Vermont.

Western flower thrips coldhardiness and its relationship to greenhouse IPM – The Field Corn IPM Program targets the Western corn rootworm (WCRW). The WCRW was first detected in Vermont in 1991 and has been found in almost every county in the state since then. Although the Northern Corn Rootworm has been an important corn pest in Vermont for many years, the new arrival of the WCRW has created concern because it is a much more aggressive and damaging insect. Because of concern over WCRW, Vermont growers have applied insecticides at planting. Yet, there is very little quantitative data on actual WCRW populations and their impact in Vermont. In 2001, two IPM methods were used by crop consultants and farmers to evaluate corn rootworm populations and potential economic thresholds. Impact of the program is being assessed using pre and post survey tools and insecticide use data. An initial survey tool assesses awareness and perceived severity of the problem by both corn producers and service providers (product sales representatives, private consultants, certified crop advisors, agency personnel, etc.) and the strategies for dealing with the problem (pesticide usage, crop rotation, etc.). At the end of the five-year program, a repeated survey will be made to assess changes in awareness and perceived severity of the problem, any adoption of IPM strategies, pesticide usage and economic impact. Annual insecticide usage data as reported by the Vermont Department of Agriculture will also be analyzed for any changes in use pattern.

Impact:
Thus far, in the study, each method was effective but the sticky trap method almost doubled scouting time compared to the more conventional sequential sampling approach. The data showed that fewer than 20 percent of the fields scouted had economic threshold levels that would warrant any insect control. Based on the surveys, 50 percent of farmers assisted by Extension personnel during the year showed a better understanding of proper IPM usage practices for

managing corn rootworm. With better IPM and Western corn rootworm information, farmers will be able to make better-informed decisions regarding insecticidal control of this insect.

This project was funded by Hatch Act funds for the State of Vermont.

Integrated pest management strategies for crop production – Greenhouse and apple growers have serious insect pest problems that limit their productivity and the value of their crops. Greenhouse growers would like to reduce their reliance on chemical insecticides. These compounds pose risks to applicators and the public. They also are losing efficacy due to insect resistance. Growers have indicated in surveys that workshops with a hands-on format are the best for transferring pest management techniques. In cooperation with other extension specialists, organized workshops in Maine, Vermont and New Hampshire were conducted to address this educational need. These workshops encouraged sound IPM practices that minimize chemical pesticide use, and that reduce risks to the environment and human health. Three hands-on workshops to demonstrate non-chemical approaches to managing pests were conducted. Growers were taught what the different pests look liked so they were better at diagnosing their pest problems.

Impact:
All of the 39 of 155 participants (25%) in three workshops that stated they planned to adopt at least one management practice recommended in the workshop did so based upon follow-up surveys. Based upon the responses from the workshop evaluations, grower participants found the session on using nematodes for control of fungus gnats extremely valuable. Many growers indicated that they would try this biological control approach in the coming year. One apple grower said that by working with University of Vermont Extension fruit specialists on developing integrated pest management strategies, he had substantially reduced the amount of pesticides used. There is usually no spraying after mid-July, and the grower says customers can safely sample their tree-picked apples after rubbing them against their shirts.

This project was funded by Smith-Lever Act funds for the State of Vermont.

Developing and implementing integrated pest management strategies for the apple industry -- Apples are an important commodity to Vermont's rural communities and working landscape. Of all the different fruits grown and harvested for sale in Vermont (i.e., strawberries, blueberries, raspberries, etc.), apples comprise 92% of total acreage planted to fruit in the state. The apple industry generates jobs and supports communities and businesses across Vermont. Annual cash receipts are estimated at $7.9 million and, when value-added products are considered, the value of the crop is reported at $25-28 million. For Vermont orchardists, 72% of their total farm income is generated from apple production. In addition, orchards are a part of Vermont's agricultural diversity, contributing to the scenic rural vistas for which Vermont is well known and which generate a significant income for the region from tourism. Apple orchards are complex ecosystems that require intensive management to produce high quality fruit. Tree growth and fruit production are intricately affected annually by the diverse biotic and abiotic factors within the environment, including numerous insects, mites, plant pathogens, weeds, and vertebrates. Effective pest management is critical in profitable and sustainable apple production.

The Vermont Apple Integrated Pest Management (IPM) program actively seeks and receives input from Vermont apple growers, private IPM consultants, ag-industry representatives, and

government personnel into all aspects of the multi-disciplinary, integrated extension and research IPM program. This input shapes program development and implementation. Based on that input, the Vermont Apple IPM Program includes: orchard visits and one-on-one interactions to provide 'site-specific' information; workshops; meetings; farm tours; The Vermont Apple Newsletter; IPM Alerts; the Vermont Apple IPM Focus website for apple IPM education and information (http://orchard.University of Vermont.edu/University of Vermontapple/pest); AIM (Apple Information Manager) website http://orchard.University of Vermont.edu/aim/) and the New England Apple Pest Management Guide, which are the result of regional collaboration; and applied IPM research addressing the priorities and needs as defined by the apple industry in Vermont and the region. This past year, 150 apple orchard growers participated in IPM workshops and learning experiences.

Impact:
The most recent evaluations of various components of the Vermont Apple IPM Program (e.g., newsletters, workshops, websites, etc.) revealed that the IPM program is presenting relevant and timely IPM information; for example, 100% of survey respondents said they used the IPM information presented in the program in their orchards with 67% indicating they frequently or almost always use the information; 98% reported that the IPM program improved their IPM practices; and 97% reduced or minimized pesticide use through using the IPM information presented in the program. On-line evaluations of the Vermont Apple IPM Focus and AIM websites brought praise as valuable IPM resources from around the world.

Hatch Act and Smith-Lever funds were used to support this research and outreach effort.

Applying long-distance interactive education to teaching Integrated Pest Management strategies -- Many Vermonters need to become certified to apply pesticides in order to be eligible for summer employment in horticultural and other agricultural businesses. Many people feel uncomfortable reading and relying on their studying of the Pesticide Core Manual as the only means of preparing for the pesticide exam. University of Vermont Extension and VT Department of Agriculture offer a five-hour training session on the key points in the manual through Vermont interactive television at 13 sites around the state.

Impact
This past year 200 students participated in the interactive television sessions. Seventy-five percent of the students demonstrated increased knowledge about safe and judicious pesticide use. All attendees felt better prepared for the test and more willing to become certified applicators after having attended the program. Fifty percent of participants showed in follow-up surveys that they had implemented at least one practice recommended in the workshops.

Smith-Lever funds supported this project.

Key Theme: Biological Control

Determination of presumed invasive traits in populations of Phalaris arundinacea --
Invasive plant species are a significant component of global change and cost our economy billions of dollars annually. The purpose of this project is to determine the plant traits that are responsible for aggressive spread of this species. Individuals from European and North American

populations have been collected. Transplant experiments will be performed to assess invasiveness.

Impact:
Natural resource managers will use this information to determine the potential aggressiveness of introduced plant species.

This project was funded by Hatch Act funds for the State of Vermont.

Impact of beneficial microbes and insect-resistant transgenic corn on non-target soil microarthropods – As new technologies are utilized in crop protection, it is important to assess their ecological impact. Special attention must be paid to microbial control agents, transgenic crop products, and residues because of their potential accumulation or multiplication in the environment. Laboratory trials have begun to evaluate toxic and chronic effects of biopesticides on Collembola. Field trials are on going to monitor effects of transgenic corn on diversity and abundance of soil microarthropods.

Impact:
Results will allow us to quantify ecological impacts of biocontrol and define future research needs.

This project was funded by Hatch Act funds for the State of Vermont.

Assessing the environmental impact of biopesticides using Collembola – Collembola play a vital role in the maintenance of productive soils. As use of microbial and biorational pesticides increases, their effects on these organisms must be considered. Acute and chronic effects of Bacillus thuringiensis (Bt) (Xentari, Dipel, MVPII) and neem on Folsomia candida were assessed. Bt had no effect on survival and fecundity. Egg production and longevity were significantly impaired when Collembola were fed neem-contaminated diet.

Impact:
Results cannot be directly extrapolated to predict field effects but allow us to identify potential risks and areas needing additional study.

This project was funded by Hatch Act funds for the State of Vermont.

Key Theme: Forest Resource Management

Improving Forestry and Timber Practices – Over the past 10 years, forestry in North America has been changing as a result of new ideas about timber harvesting and management. These concepts are collectively known as "low-impact" harvesting, or forestry. This term in most of North America is a misnomer; since forests are managed to create impacts -- positive impacts. There is no book in the U.S. that explains the concepts of 'low-impact' forestry as a process of creating 'positive' impacts on the landscape. A faculty member of University of Vermont Extension wrote a book for Island Press, a major publisher of environmental works, entitled:

Positive Impact Forestry. The book describes activities that woodland owners can use to manage forest for wildlife habitats, recreation, long-term investment potential and other benefits.

Impact:
The ideas in the book will help thousands of woodland owners in Vermont, New England and in the U.S. to see the good things they can accomplish with their lands while avoiding all of the pitfalls of various management decisions.

Logger Education -- There are two different logger education programs in VT, LEAP developed by University of Vermont Extension, and another program that evolved from a portion of the Vermont Forest Products Association. The Vermont Forest Products Association recently approached LEAP to develop a special arrangement for its members to participate in the LEAP program. Due to an agreement that was reached last winter, the LEAP program has become the exclusive provider of education to loggers who are also members of VFPA.

Impact:
Since the VFPA/LEAP agreement, LEAP was approached by the Sustainable Forestry Initiative (SFI) who requested and agreed to fund five replications of the LEAP Institute during the fall to reach approximately 150 logging contractors who need SFI certification.

COVERTS -- Woodland owners are mostly reluctant to manage their lands solely for timber production. If, however, a manager proposes a prescription that can create or improve habitats for wildlife, an owner is much more inclined to schedule a timber sale, establish access routes and perform other forestry-related activities that involve an expanded view of forest land management . The Coverts Project has emphasized these wildlife-oriented management practices since the mid-80's. Each year approximately 40 woodland owners in VT complete the 3-day workshop, and in exchange for the experience, the participants agree to share and discuss the benefits of pursuing good forestland management with neighbors in their communities.

Impact:
Since 1984, the Ruffed Grouse Society has provided financial support for this effort, which originated in Vermont. The concept has now spread to more than 17 states. Thousands of woodland owners in the U.S. have completed this training and countless acres have been improved by the 'holistic' methods taught in the Coverts curriculum. Many Coverts cooperators in Vermont have translated their involvement with Coverts into leadership positions. A number of participants have become legislators, while others have provided or are currently providing leadership for important environmental or philanthropic organizations in Vermont. Virtually anything that involves forests or wildlife in Vermont also involves Coverts. It has become a well-respected organization that represents the interests of non-industrial private forest owners in Vermont and elsewhere.

Stumpage Data Sharing – Forest managers, woodland owners and others often do not have adequate information about stumpage markets to make good decisions when it comes to harvesting timber and selling stumpage. The University of Vermont Extension System has been gathering stumpage data for foresters, timber buyers and county foresters on a quarterly basis since1981.

Impact:
It is the longest running set of quarterly stumpage data in the U.S. Hundreds of managers, woodland owners and others use the quarterly stumpage data to make decisions. These data have the potential to be used by buyers and sellers to reach equitable contracts related to the buying and selling of timber. The stumpage data is reported for 12 product groups and is available online at www.stumpage.University of Vermont.edu.

Key Theme: Sustainable Agriculture

Professional Extension Leadership Training in Sustainable Agriculture -- In the 1990 Farm Bill, Congress required the USDA to provide training for Extension and other personnel in the area of sustainable agriculture. Through University of Vermont's Center for Sustainable Agriculture (CSA), University of Vermont Extension provided training in sustainable Agriculture for northeastern states. Since its inception in 1994, CSA has organized three major sustainable agriculture conferences in New England. Attendance at conferences exceeds 700 people. More than 225 farmers, service providers and university personnel attended CSA-organized farm tours around New England. In 2001, CSA completed a three-year project to develop understanding, skills and leadership in sustainable agriculture. Fifty-one extension and university specialists, USDA personnel, farmers and representatives of non-profit organizations attended classroom trainings. Participants then applied new skills to four regional projects focusing on preserving rural character (New Hampshire), urban agriculture (Connecticut, Massachusetts, and Rhode Island), soil and water quality (New Jersey), and new markets for farmers (Maryland and Delaware). The regional team approach reached 2,344 people at 42 events, produced three resource kits, and established a non-profit marketing institute.

Impact:
In September of 2002, CSA held a professional development conference aimed at enhancing the role of agencies in organic agriculture. Ninety –three percent of the 150 participants stated that the conference increased their understanding of organic farming. Evaluations of farm tours show that 95 percent of 225 participants learned something new about sustainable agriculture. As a result of CSA professional development efforts, 140 Extension specialists from 11 northeastern states are more skilled at whole-farm planning and working with farmers as collaborators.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Key Theme: Biodiversity

Mathematically general predictions and plant population dynamics -- Habitat fragmentation is creating many subdivided plant populations. The purpose of this study was to understand how habitat fragmentation affects extinction dynamics in the weed, *Cardamine pennsylvanica*. Results indicate that completely isolated populations have the greatest probability of extinction. However, non-fragmented populations experience a higher extinction risk than populations with some small amount of fragmentation.

Impact:
Natural resource managers will use this information to determine the conditions that will minimize extinction risk in plant populations.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

National Goal Area 5: Enhanced economic opportunity and quality of life for Americans

University of Vermont Extension programs are designed to empower people and communities through research-based information and education, to address the economic and social challenges facing our youth, families, and communities. Vermonters know that change is inevitable. For many Vermont communities, the type of change during the last 15 to 20 years was not favorable. While jobs dependent upon land and natural resources have declined, the cost of living in rural areas has increased. Studies indicate a number of problems have resulted, ranging from declining levels of voter participation and public apathy toward elections to decreasing interest in volunteer activities and community groups. They also document the younger generation's apparent disinterest in public affairs and lack of knowledge about our political system. Robert Putnam has quantified this civic disengagement, documenting a 25-30 year decline in membership in civic-oriented organizations.

Rural communities that have survived and prospered have some things in common. In these towns, local efforts are fueled by a positive attitude and guided by a shared vision for the future. They promote open discussion of community needs, opportunities, and ideas in a non-judgmental atmosphere that leads to inclusive decision-making.
University of Vermont Extension works with community leaders to establish a shared vision for the future of children, youth and families. Through open discussion of the current reality against this vision, opportunities and ideas are shared in a non-judgmental atmosphere leading to inclusive decision-making. Working with Extension staff, Community Steering Committees provide leadership for assessment, program initiation/expansion and evaluation

Programs such as University of Vermont Extension's Northeast Kingdom (NEK) Collaborative, have leveraged more than $13 million in grants and loans supporting economic and community development projects in Vermont communities designated as Rural Economic Action Partnership (REAP) Zones. By creating periodic meetings in which groups such as economic development agencies, non-profit organizations, health care and other organizations having a stake in community well being come together, the opportunity for obtaining useful grants and loans supporting community infrastructure, housing, and rural business opportunities increases. Additionally, more than $320,000 of in-kind donations and financial contributions was raised in support of community-based improvements. Youth participation rates in community activities benefit from spin-off programs. Youth-oriented programs are based on long-term, sequential learning models that emphasize a combination of creative educational, recreational and experiential approaches to improve life, community awareness, and community involvement skills. To date, 69% of 3,732 participants indicate that they have made at least one positive behavioral change as a result of program involvement. Follow-up of a smaller sample shows that 33 participants made significant gains in competency-related areas including social skills, assertiveness, tolerance, and managing frustration. Combined with youth 4-H programs, these projects engage many community members, as more than 2,000 adults volunteered over 90,000 hours (a volunteer value of nearly $1 million) in support of community-based programs.

University of Vermont Extension also provided municipal officers with communication assistance through the Information Technology Capacity-Building in Rural Vermont program.

Introducing town and municipal officers to communication opportunities using the Internet has helped 50 Vermont communities produce and maintain websites available for municipal businesses. Municipal officers and local planners from more than 100 communities have improved the use of their computer resources as communication tools. Eighty percent of towns in Vermont send officers to an annual educational conference conducted by University of Vermont Extension, where they learn how to succeed in their government positions. Large majorities find the information useful and anticipate using it frequently, and gain confidence that they can perform their jobs well.

Strong families contribute to positive individual development and quality communities. Family and community related research can provide a strong knowledge base for educating parents, consumers, children and youth, policy-makers, agencies and organizations. A study of the social return on investment of the Vermont Development Credit Union demonstrates that membership significantly improved financial well being, wealth building, increased control over, and satisfaction with many areas of life, including home, school and work for low-income consumers. Membership in this credit union goes beyond simply helping people with their finances.

Education, highlighting communication skills and decision-making tools, empowers individuals and families to apply practices that result in increased involvement in their communities. Targeted youth and families receive concentrated programming in life skills to enhance their success as active productive community participants. A High School Financial Planning program helped 790 students gain basic knowledge about personal financial planning. Results show that 37% of program graduates demonstrated improved expense-tracking skills, 45% began saving money, or increased the amount of money they saved, and 38% had greater confidence in their ability to manage money effectively. A plan to reach more youth involved the use of Vermont Interactive Television at 11 sites across Vermont. After attending the session, 40 educators, representing 1,397 teenage students, requested the program for their classrooms.

This past year 675 parents participated in parenting workshops designed to improve parenting skills for families at-risk of violence or dissolution. By working with the Vermont justice system, University of Vermont Extension has been able to work with divorcing or separating parents to improve their skills during this period of transition. Since the workshop is mandated by the State, many do not initially attend with the expectation of gaining new insights. However, the 599 participants of over 36 workshops held around Vermont overwhelmingly reported that the four-hour workshop provided them with new information, skills, and confidence to improve interactions with their children during their period of separation or divorce.

A Babysitting Safety program teaching teenagers the behaviors and skills required to become competent babysitters has provided northern Vermont counties with more than 350 certified babysitters. At least 82 students who completed the course and responded to a survey this year reported that they were better able to market their skills after participating in the program. These skills were put to use by one teenager who saved four children from a fire in a house where she was babysitting. She credits the babysitting safety course for providing her with the skills to save the lives of the children.

Children and adults across the State of Vermont face the challenging problem of lacking continuous access to nutritious, safe, acceptable, and affordable food. Food security is an issue in

the remote rural areas of the state and in the populated urban areas, affecting people of diverse ages and backgrounds. In 1999, USDA released estimates on the prevalence of food insecurity and hunger by state. In Vermont, an estimated 7.7% of households were food insecure, and 2.6% were food insecure with hunger between 1996 and 1998. For this reason, the new Healthy Vermonters 2010 report includes the objective to "increase food security to reduce hunger" statewide. University of Vermont Extension faculty and staff took steps in 1998 to promote interdisciplinary programming by developing the People Grow Project. This activity built a strong network of agriculture, food and anti-hunger organizations to create innovative linkages among local food producers, institutions and consumers. Low-income audiences were targeted to receive education in food production (gardening, small farming), food preparation, preservation, nutrition, and food safety. As an outgrowth of these efforts, the current 4-H gardening project works with low-income youths to build skills in gardening and community involvement. In addition to learning ways to supplement food stores and contribute to the well being of their own families, students experience the responsibility and rewards of giving to others in need. This is accomplished by having students contribute part of their garden harvests to the Vermont Food Bank, local food shelves, and soup kitchens as part of the Plant a Row for the Hungry program. One of the most satisfying outcomes of the project for the 78 program volunteers was learning that the 341 young, low-income gardening students unanimously chose to continue planting a portion of their garden, and in many cases planning to increase the share, to donate to other people in need. The program continues to garner funds for expansion to other communities.

In stark contrast to this lack of food security for so many Vermonters is an agricultural state that prides itself on production of a wide range of healthful and tasty products that are enjoyed by millions of people across the country. New and innovative tools for assisting entrepreneurs with marketing strategies are emerging from the academic activities of faculty and students. Providing test sites in Vermont communities for this research is an effective learning opportunity for students, teachers and community members. Business people, state agency personnel and others have found that collaborations can be the key to success when managing change for a small state, such as Vermont. A multi-institutional program run with Cornell University involved the development of the Northeast Center for Food Entrepreneurship (NECFE) in order to provide a centralized source of information and assistance for small and start-up food manufacturing businesses in the region. The center provides one-stop shopping for business owners and managers in need of advice and information regarding product processing, packaging, labeling and marketing regulations. Efforts of NECFE have led to the evaluation of 456 new food prototypes for safety and technological feasibility, training for 50 instructors in the region who teach business development courses and workshops, the development of Hazard Analysis and Critical Control Point (HACCP) programs for juice, meat, seafood and egg products, the creation of new farmers' markets, and access to pilot plants to produce market trial products and demonstrate proper use of equipment. NECFE has reached over 2,000 potential and actual business entrepreneurs through workshops, websites, and phone questions answered. Efforts have assisted region-based entrepreneurs in developing sustainable manufacturing operations of high quality foods for consumers. Expansion of web-available information and the use of video conferencing are planned for the future.

For many decades, Vermont's landscape has been a strong allure to visitors and residents alike. In many ways, tourism and the quality of community life have become inextricably tied to agriculture. The loss of farms has created concern about conversion of farmland to forest and

development. University of Vermont researchers have demonstrated one way, outside of the agricultural sector, that farms may have an impact on Vermont's economy. An innovative research approach incorporated visitor behavioral survey data into an economic input/output model to estimate the cost of changes in tourism behavior attributed to farmscape experiences. Based on winter tourist trip data alone, Vermont tourism sector relies on farmscapes for approximately $119.9 million per year. The Vermont economy would lose an estimated $201.5 million, 3,800 jobs, and $11.9 million in indirect business taxes if farmscapes were not part of the tourist experience. Perhaps the relationship between farming and the quality of life in Vermont is summed up by the following quotation attributed to Frank and Melissa Bryan. "Vermont without farmers could be a good place, but it would never be Vermont; and while there are lots of good places, there is only one Vermont." By analyzing the impact farmscapes have on the Vermont economy, University of Vermont Extension has shown just how much truth there may be to this remark.

Key Theme: Promoting Business Programs

Northeast Center for Food Entrepreneurship -- Vermont Agricultural Experiment Station and University of Vermont Extension have been working with Cornell University to assist new food-based processing and retail businesses in becoming successful enterprises. In its third year of operation, the Northeast Center for Food Entrepreneurship (NECFE) continued to successfully provide comprehensive assistance to food entrepreneurs with extended geographical coverage. The two center sites, Cornell University and the University of Vermont, have developed critical expertise to better address clients' needs.

In 2002, NECFE personnel responded to 1,160 inquiries for assistance on marketing a food product. NECFE personnel worked with 149 entrepreneurs who needed safety evaluations of 489 specialty products and processes for commercial production. In total, the NECFE laboratory analyzed and logged in a database 395 samples of food prototypes to address their safety and technological feasibility. Additional areas of assistance included explanation of labeling regulations, development of nutrition facts, collaboration in the creation of farmers markets and joint marketing activities, technical support to shared-use kitchens and co-packers, access to pilot plants to manufacture batches of products for market trials and to demonstrate small-scale equipment. A joint effort from Cornell and Vermont experts was instrumental in achieving HACCP compliance of the Vermont meat industry, at the request of the Vermont Department of Agriculture. NECFE provided direct assistance to 141 entrepreneurs on business planning advice, marketing, resource referrals, ingredient or material sources, and business strategies. Cooperation with agencies throughout the region facilitated the delivery.

NECFE conducted and sponsored 24 different workshops and conferences in the northeast totaling 768 attendees and covering a broad range of topics relevant to specialty foods production. NECFE co-sponsored with Rutgers University and University of Colorado at Denver, the First National Conference and Education Symposium: Food Business Incubation Summit, held at New Brunswick, NJ. The 108-page manual "Small-Scale Food Entrepreneurship: a Technical Guide for Food Ventures" was printed for the third time to cover the demand for this resource. More than 2,000 copies have been distributed in the Northeast. Several state and municipal agencies have requested the manual as a reference for their field staff. NECFE published 4 Venture newsletters this year and distributed to over 1,200 interested parties. Complete archives are available on the website, which has been expanded to include lists

of shared-used production facilities and co-packers for small processors. NECFE facilitated and attended numerous tours, meetings, conferences and trade shows as invited speakers for technical presentations, to promote NECFE, and to create partnerships and linkages with agencies, institutions, organized groups, individuals and regulatory concerns in the Northeast, reaching over 1,500 people. NECFE conducted evaluations to assess the effectiveness of NECFE efforts. The evaluation activities consisted of four staff focus groups to document project process, workshop evaluations from 204 participants to obtain feedback and short term outcomes, and a follow up telephone survey of 255 clients to determine satisfaction with services, impact on social, human, and economic capital, and demographics.

Impact:
The center provided direct assistance or training to more than 1,900 people in food safety, food processing, and business development and marketing, complemented by appropriate referrals to existing local service providers. Eighty-five of clients agreed that NECFE services met their expectations and 87% agreed that NECFE services provided the information and assistance that they needed.

Workshop participants expressed high levels of satisfaction with workshops, presenters, and materials, and found the content useful. Major benefits included hands-on experience, learning food safety and sanitation, regulatory and licensing information, marketing, labeling, and packaging, having the opportunity to work with experts, find out about local resources, receive referrals, and networking with others. Fifty-seven percent of workshop participants currently operate a food business, with 80% of those reporting this business as their primary or secondary source of income.

Based on a survey of 255 people, 42% of current businesses served are farm-based. Forty-five of businesses created between 1 and 40 full time jobs while 56% created between 1 and 40 part-time jobs. An average of $245,000 in total sales were reported, with a median value of $27,500. Regarding client income changes, 67%, reported their income has increased or stayed the same since they started the business. Major skill gains were reported in product safety/sanitation (32%), labeling/packaging (29%), regulatory information (22%), and networking (20%). Major changes in client attitudes included increased self-confidence (32%) and more business savvy (16%).

Smith Lever and Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

E-commerce: Indicators of small business and community economic development -- Access to timely indicators is necessary for market studies, business planning, etc. An effort to integrate these indicators within an approach to E-commerce has been initiated to offer access to online data for display (tables, maps, and graphs) and down-load in spreadsheet or GIS databases.

Impact:
This project has answered 75 requests for information from small business persons, such as questions about demographics from an educational service targeted at elders and a group planning to open a child care center. A number of small businesses have integrated these data into their business plans or, more generally, into their strategic planning.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Alternative coffee market in Vermont: Companies, cafes, and consumers -- Alternative coffees have an unrealized potential for growth in Vermont. This study examined the behavior of coffee wholesalers, retailers, and consumers with a view to promoting market growth. With few exceptions, wholesalers and retailers are not marketing alternative coffee traits—i.e., organic, fair trade, and shade grown—although certain consumers seem interested, and most lack information.

Impact:
The project is generating information necessary to support wholesalers and retailers in their product development and marketing plans and to support consumers in making better choices.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

Linking community economic development with local natural resources -- There is a need in the Northeast Kingdom (NEK) to further process wood raw material like logs, pulpwood and lumber into higher value wood products. The first critical step in accomplishing this is to develop a greater capacity for kiln drying wood to the final moisture content. In particular is the need to develop small-scale drying operations suitable for the majority of small wood products businesses common in the NEK.

Information on alternative kiln drying methods has been researched, assembled and disseminated to small-scale wood products businesses, forest landowners, and small sawmills. One-on-one meetings and small group discussions were held to discuss the scientific principles of wood drying and practical methods of kiln drying, conditioning and equalizing wood for further high-value processing.

Impact:
At least four owners of small sawmills and one forest landowner have adopted kiln-drying methods for their wood. Average wood value increased by 75 percent. Wood market sales volume doubled. At least three small sawmills achieved an average increase in gross revenue of 50 percent. Employment increased by five people. Local woodcraft persons were now able to purchase a supply of kiln-dried wood in their communities. Community tax revenue increased. Five forest landowners experienced an average 30% increase in their timber market volume. This allowed the landowners to increase the volume of forest management treatment, encouraging increased forest sustainability.

Income Tax School -- The income tax rules, laws and regulations for Vermont and Federal change yearly. Vermont is the most rural state in the union, second smallest population, lacks rural and urban services for clientele, and has one of the smaller incomes in the Northeast. State and Federal tax forms are often very complicated for Vermonters, due to the special circumstances related to rural life and businesses. Income tax schools provide opportunities for Vermont tax preparers to gain expertise and apply useful information to improve market competitiveness and savings for their clients. The University of Vermont Income Tax School is a 2-day school for CPA's, tax accountants, and tax preparers. The Income Tax School registered 373 CPA’s, tax practitioners, and others involved with tax issues.

Impact:
Participants of the Income Tax School represent approximately 106,000 returns filed, or half of all returns filed in the state. Ninety-one percent of respondents stated that they improved their understanding of tax law and tax law changes after attending the course. The income tax school has decreased the average amount of time spent per tax return for tax-preparers. One participant was able to save a client $250,000 in taxes because of what the learned at the school.

Smith-Lever funds were used to support this program.

Key Theme: Jobs/Employment

Rural Farm Family Vocational Rehabilitation Program -- Providing guidance to successfully maintain employment or self-employment or re-enter the workforce. Individuals with disabilities experience an unacceptable high rate of unemployment. According to the Census Bureau, 76% of individuals with significant disabilities are unemployed. Individuals with disability can and want to work. Individuals with disability face physical barriers such as lack of transportation, point to point accessible public transit, work modifications and social barriers such as loss of health benefits, employer attitudes regarding abilities are major hurdles to overcome that the able bodied person does not have to struggle with.

Individuals with disabilities many times need extra support including guidance and counseling in areas of social security benefits, health restoration worksite and home site modifications and transportation to maintain employment. Employment development is also sometimes needed to educate employers about the abilities of individuals with disabilities. Rehabilitation community providers, such as Rural and Farm Family Vocational Rehabilitation Program provide vocational services such as transportation to and from work, worksite and home site modifications, social security and health coverage benefits information, guidance and counseling to reduce the physical and social barriers to enter into or maintain employment.

Rural and Farm Family Vocational Rehabilitation Program has invested a total of $664,150 towards paid vocational services from 1997 to 2001 directly to 304 individuals successful in either maintaining or entering into employment. Rural and Farm Family Vocational Rehabilitation Program successfully assisted 165 individuals, from 1997 -2001 involved in agriculture, to maintain the farm despite their disability. The program also successfully assisted 139 individuals, in the same time period, with significant disabilities to enter into successful employment not involved with agriculture. Paid services include worksite, home site modifications, health restoration services, training and education, transportation and other services to reduce the physical and social barriers to employment. Referral to other services, similar benefits, counseling and guidance were also provided at no cost to Rural and Farm Family Vocational Rehabilitation Program.

Impact:
This past year, by facilitating skills training, site improvement and guidance to disabled workers, the Vermont RFFVRP program has successfully maintained or regained employment for 66 people. Sixty-six percent of clients are agriculturalists or work in fields directly supporting agriculture and farming, and 84% of clients have vocational goals in agriculture. Sixty-three percent of those seeking assistance learned about the RFFVRP program from neighbors, peers and former RFFVRP clients. Referrals exceeded goals by 6%, and rehabilitations exceeded goals

by 37 percent. One of the successful clients received counseling, guidance and financial assistance from this program that allowed him to maintain his farm employment. A seriously injured farmer who had been run over by a forage wagon, sustained broken vertebrae, ribs, and had multiple contusions. While he was in the hospital he was diagnosed with diabetes and hyperthyroid disease. Networking and information compilation provided the farmer with information to keep the farm operating during this critical time. Upon returning home from the hospital, the farmer learned his daughter had just been admitted to the hospital with *E. coli* and their well had gone dry. University of Vermont Extension personnel were able to counsel, find help with chores and offer nutritional recipe ideas for the near future. Working with agencies, funds were released in a timely manner to assist the farm with labor supports during the farmers healing period. The farmer has been able to return to work part time and continues to heal.

Smith-Lever funds were used to support this program.

School Food Safety and Sanitation certification program -- Children are more vulnerable to foodborne illness due to the fact that their immune systems are not fully developed. Many children in Vermont eat breakfast, lunch and snacks at their schools. The Vermont Department of Education, in partnership with University of Vermont Extension, developed a curriculum in Food Safety and Sanitation that was offered to school food service workers. The American School Food Service Association recognizes the ten-hour certification course.

Impact:
Extension expertise was used to design a nationally recognized certification course in food safety and sanitation for school food service workers. Since FY2001 150 food service workers have taken the training, and 137 have passed the certification test measuring knowledge and skills covered in the training. This certification makes them eligible for a promotion and pay raise. Five of this year's 114 certified food service workers returned a follow-up survey to say that participation in the food safety certification course played a role in securing employment or promotion in their current jobs. This combination of education and incentive developed through a partnership between University of Vermont Extension and the Vermont Department of Education will lead to safer and more sanitary school food environments for Vermont children.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Key Theme: Community development

Northeast Kingdom Collaborative -- Many rural areas face economic and community development issues having a very different character than communities whose needs are mainly defined by poverty. Often, the defining features are geographic isolation of communities separated by long distances, absence of large metropolitan centers, low-density settlement patterns, historic dependence on agriculture, continued population loss, out-migration, and economic upheaval or economic distress. The three counties of the northeastern corner of Vermont comprise Vermont's Northeast Kingdom, a term coined by the late Senator George Aiken to identify a region which has long challenged policy makers because of its seemingly endemic poverty, chronic underemployment, and traditional, independent, Yankee rural character. Regardless of the role of rural culture, quantitative social and economic indicators consistently substantiate the status of the Northeast Kingdom (NEK) as the area of Vermont most in need of social program assistance. Unemployment in the region typically runs between 50 and

100% of state averages, home value is half of the state average, and per capita income stands at 75 to 80% of the state average. The percent of the population below poverty level for all three counties is between twelve and fourteen percent, with several towns showing as high as 22% of the population living below the poverty level. The Northeast Kingdom is designated as a Rural Economic Action Partnership (REAP) Zone by the USDA (November 2000). The NEK Collaborative was formed in 1996 to find ways to collaborate on economic and community development issues in the "Northeast Kingdom." The NEK Collaborative is comprised of members from economic development agencies, non-profit organizations, health care and other organizations dedicated to improving economic and community well being for people in the Northeast Kingdom. Periodic strategic planning and benchmark monitoring meetings have taken place since then. The Collaborative has used its web site to reach those parties who wish to participate and support this effort. This has resulted in an increase of the general membership, thus more community members coming together to help move necessary changes forward.

Impact:
Since receiving REAP status, the NEK Collaborative has leveraged more than $13 million in grants and loans supporting projects for the Northeast Kingdom, primarily in areas of community infrastructure (water and waste disposal), single and multiple family housing, and rural business opportunity development. University of Vermont Extension has received a $30,000 grant from the Snelling Center for Government in order to serve as the administrative partner for the NEK Collaborative, work with committees to establish and evaluate progress toward benchmarks for projects included in the strategic plan, maintain web publication of documents, and submit reports to USDA as required. One town has been pursuing steps toward the development of a new business and workforce opportunity in the area where a major employer closed its doors, leaving many in this small community out of work. The new alliance provided the opportunity, through funds awarded, to purchase the existing facility and equipment and develop wood products for retail both in this area and other markets. Efforts have led to nine communities being awarded almost $15 million in combined awards to develop wastewater projects. Four communities have been awarded $900,000 for rural and low-income housing development projects as result of NEK collaborative efforts. This past year USDA Rural Business opportunity Grants have been awarded to the Towns of Hardwick and Brighton. The Hardwick grant will be used for paving and the Brighton grant will be used to develop a business plan for the employee owned Woodworkers Alliance. Five new members of the Northeast Kingdom Collaborative have visited the new web site, downloaded the membership form, and submitted the completed form to the Administrative partner for addition to the database and meeting notification listserves. Of those new members, all have indicated they wish to serve on the board.

Success in collaborative efforts and presentations has led to expansion on collaborative efforts. One University of Vermont Extension member presented a workshop on Building Community Collaborations at the National Healthy Mothers, Healthy Babies conference in Sand Key, Florida. This opportunity came from a referral by a participant at a presentation done for the National Coalition on Immunization. It has lead to a referral for the Maternal Child and Family Health Coalition in St. Louis Missouri. University of Vermont Extension may be asked to work with this group to move them forward in reaching the vision for their community-based programming. University of Vermont Extension has recognized a great interest in Building Community Collaborations related to health serving organizations.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Town Officer Leadership Training -- The Municipal Officers' Management Seminars (MOMS) are held each fall at 4 locations. A Town Officers' Education Conference (TOEC) is held each spring at five locations. . These events provide information and education to Vermont's elected and appointed municipal officials. The overall purpose of both the MOMS and TOECS is to give municipal officials the confidence they need to manage the legal, economic, and social challenges of local government. Session topics include legislative updates, training in new program requirements, federal and state funding opportunities, and management skills such as meeting management, ethics, dealing with the public, communication strategies, and time management.

Impact:
This past year 1,003 town officers attended a Town Officer Education Conference. Eighty percent of Vermont towns paid to send at least one town officer to a TOEC. Sixty-eight percent of participants reported they received necessary information to improve their job performance, while 59% reported they would use information learned "fairly frequently" or more frequently. Confidence appeared to be improved, as 58% of participants reported they would be more effective in making decisions as a local officer as a result of attending the conference.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Stewardship of the Urban Landscape (SOUL) community leadership education --
Community volunteers have a need to improve their leadership skills to gain support for projects in their towns or organizations. The SOUL Leadership Program, which teaches leadership competencies along with resource information related to improving a community's landscape, has been a successful approach to building capacity. Five 35-hour SOUL series were conducted this past year.

Impact:
This past year, 26 people completed the SOUL series. Fifteen of these graduates also completed community projects as an extension of the program. Examples of projects completed this year include conducting tree inventories, landscaping homes for Habitat for Humanity, planting memorial trees and trees on Arbor Day for their local towns. Six graduates have since gone on to serve in elected, appointed or volunteer positions for their local governments. Even before the SOUL Leadership class had ended, one participant applied for and was appointed the Tree Warden in Newport, Vermont in a competitive process. In reporting her experience, she connected her lessons learned in the SOUL Leadership class to her success.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Take Charge/ Recharge -- Community capacity for directing change increases with skillful facilitation of community-based meetings to obtain citizen input. Take Charge and ReCharge programs are designed to work with rural communities in need of community development action plans.

Impact:
As a result of the Re-Charge program, 35 members of Derby Line Village secured grant monies to undertake a traffic study in the village area. A Take Charge program in Essex County included

over 75 residents in attendance, and received $60,000 in grant funds from the Vermont Sustainable jobs Fund to assist in the implementation of their goals.
As a result of these efforts, 63% of participants demonstrated that they used their new knowledge in leadership and communication addressing community concerns.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Symbolic attributes: Differentiating rural towns from planned shopping centers -- This study attempts to answer the question, "how do symbolic and performative attributes influence consumers patronage of town centers and planned shopping centers?" This project examines how to differentiate town center shopping areas and planned shopping centers in rural Vermont. Rural consumers prefer to shop for apparel in other town centers, rather than in chain discounters such as Wal-mart. Findings are preliminary and cannot be generalized beyond the towns surveyed, however.

Impact:
Information will help communities target retail marketing strategies.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

Forecasting tourism demand in Vermont using integrated econometric models – Vermont tourism impacts the state by approximately $4.07 billion annually. Between March 1999 and March 2000 U.S. tourists made 3.84 million visits to Vermont, with an average party size of 3.2 people, equivalent to 12.25 million person-trips. U.S. tourists spent $2.58 billion in Vermont during this period. Economic development groups seek to better understand the structure of the Vermont tourism industry, in order to appropriately market plans for Vermont business and products. Survey data collected in 2000 and 2001 show a 47% increase in tourism visits between 1999 and 2001. In 2001, households in New England were four times more likely to make a tourism visit to Vermont than the average U.S. household. In 2001, relatively upscale households demonstrated the highest propensity to make at least one trip to Vermont, and households headed by individuals who have received a college or post-college degree were over 50% more likely than the average U.S. household to make one ore more trips to Vermont. Based on 2001 data, four distinct groups of households traveled to Vermont in disproportionate numbers, and hence warrant special attention: metro-achievers, small town movers, small town rustic, and new eco-topia.

Impact: The study will provide a framework for estimating variables influencing tourism demand, and elasticities for each variable relating to number of visits, as well as to forecast the number of visits. In addition to business promoters, business owners and the general public will also benefit from the findings by using them to create a feasible strategy to adapt to the tourism industry, and to understand tourism-related issues pertinent to Vermont.

This study was supported in part or in full by Hatch Act funds.

Key Theme: Information Technologies

University of Vermont Extension webpage -- A large segment of the general public uses the Web and looks there first for goods, services, and information. To remain contemporary and

viable University of Vermont Extension must have a strong Web presence. Many Extension programs are developing Web sites or have developed sites that require regular maintenance. Extension's Web presence enhances other traditional forms of program delivery to provide education and information. University of Vermont Extension has been broadcasting a twenty-minute daily segment, *Across the Fence*, on network television continuously for over thirty years to inform the Vermont public about important Agricultural Experiment Station and Extension-oriented programs and news. Selected *Across the Fence* segments produced by University of Vermont Extension are now available in a streaming video format on the World Wide Web.

Impact:
Streaming video on the Web allows people who are unable to view *Across the Fence* on television to receive the content of selected programs on the World Wide Web.
Beginning in March, Extension Website traffic is being monitored using the AccessWatch software provided by CIT. During March, Extension pages were accessed over 30,000 times.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Woodnet website for woodworkers -- Small business owners and craftsmen in the wood product industry work in isolation and needed to form a network to share information, have monthly meetings, and find ways to share in the marketing of their value added wood products. By collaborating with an officer in the Vermont Craft Council, and a wood craftsman who desired to bring a wood network about, University of Vermont Extension connected him with the Sustainable Jobs fund to obtain a grant to help bring the small wood crafts persons together.

Impact:
A $5000 grant was obtained and the network is now in place, known as WoodNet. Members of WoodNet meet regularly to share ideas on marketing, exporting, and work to find ways to bulk purchase needed production inputs. The grant also paid for development of a Website www.woodnet.org. The website has received 400 hits per month on average and the members participate as group in the VT Wood Manufacturers Association.

CyberQuest -- One aspect of the digital divide relates to gender, in particular, among middle school age children. CyberQuest, a one-week day camp was conducted for ten middle school girls at the University of Vermont.

Impact:
Eighty percent of CyberQuest participants learned new computer skills, increased their comfort level using information technology, and became more aware of careers that involve computers and information technology. One CyberQuest participant returned for the third year this summer. Her father feels that as a result of the program she is very capable and confident using a computer. In their family this is especially important because he is blind and she is able to help him get anything he wants on the Internet.

Key Theme: Parenting

Active Parenting Program -- Active parenting programs are conducted in cooperation with Vermont Family Court for at-risk families. The Active Parenting curriculum is designed to improve parenting knowledge, skills, attitudes, and behaviors by parents of pre-schoolers,

school-age children and teenagers. This past year's programs were conducted in Vermont's northeast region.

Impact:
The program reached parents of 76 families this past year. Ninety percent of participants reported they intended to use information presented at the workshop. Follow-up surveys show that thirty-four percent (34%) of participants reported improvements in parenting knowledge, attitudes and skills. An equal number, 26 participants, reported a change in behavior that improved family interactions. A common change in behavior reported was "staying calm and yelling less." Changes in family interactions reported by participants can be summarized with these quotes: "My son is coming around, [says more] 'I love you's', and his responsibility has increased"; "My children are staying in their beds at night more, not coming to sleep with us"; "My daughter opened up at one of the visits and I was able to learn what her problem was by asking her gentle questions. The counselor said that it went well and though I do not live with my daughter she knows that I am there for her."

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Assisting families during separation and divorce -- Strong families contribute to positive individual development and quality communities. Education, highlighting communication skills and decision-making tools, empowers individuals and families to apply practices that result in increased capacity and enhanced well-being. Family and community related research can provide a strong knowledge base for educating parents, consumers, children and youth, policy-makers, agencies and organizations. Divorce and separation of parents can disrupt the lives and development of 40% to 50% of homes nationally and in Vermont. Parent education about the need for parents to communicate in the best interests of their children and to cooperate to protect their children from their adult conflict helps families' structure physically and emotionally secure environments for children. The transitions and adaptations family members must make can be viewed as opportunities for growth and development.

Coping with Separation and Divorce is a four-hour parenting seminar mandated at the discretion of the Vermont Family Court judges for parents with children under 18 who file for divorce, legal separation, determination of parentage and child support (not married), and changes in parental rights and responsibilities. University of Vermont Extension provides the curriculum and trains community volunteers with related professional skills to facilitate the program in their local family courts. Over 100 classes are taught each year in 11 family courts, and all fourteen county courts mandate parents to attend the classes. Twenty four facilitators have been trained to teach the University of Vermont Extension-produced curriculum using video clips, role-plays, group discussion, a written response activity, the parent handbook, overhead summaries, a resource list and a take-home handbook activity.

Impact:
Thirty-six seminars conducted around Vermont reached 599 separated parents. Seventy-five participants reported that the information learned in the program will help them to do a better job parenting during this period of transition, while 72% reported learning something from the program that they intend to use.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Key Theme: Workforce Preparation – Youth & Adult

Horticulture education program for at-risk youth -- According to an assessment report by the United Way, there is a strong need for more meaningful youth programming. The report cited a high risk of substance abuse and smoking as well as a high rate of youth inactivity. Many of these youth have also been identified as having a range of learning disabilities that makes it difficult for them to experience success in traditional youth programs. Another report found that less than half of our young people feel that they are valued by adults in their communities. At-risk youth need to be engaged in hands-on productive activities with a clear purpose. Creative programs are needed to address the multitude of issues associated with this often-misunderstood group. A supportive yet structured environment outside of school needs to be created for them to thrive.

A summer job training program and after school program for at risk youth were created and piloted. These programs engage young people in productive work on the farm and in the community and teach them necessary life, job and entrepreneurial skills. The educational programs focus on building teamwork and cooperation between youth through growing and marketing off-season crops in the greenhouse. The youth worked in teams to transform the greenhouse into a productive space. They learned to work together to get a task done, developing teamwork and communication skills. The young people also learned how to grow a product, develop a name and label for it, and sell it, developing important entrepreneurial skills in the process.

Impact:
Results from a written survey by participants in the program show that 88% of the 67 participants enjoyed the program very much, 75% of participants felt they learned a lot about horticulture and enterprise and 88% felt that this program challenged them. The teacher for the class felt that in her nine years of teaching there, this is the best community project she has done with her class. Additional pre and post-testing showed that 85% of participants increased knowledge about growing horticultural crops, while 75% demonstrated increased knowledge of agriculture and food systems in general. Eighty-five percent of participants demonstrated an increased ability to excel in the job market, and 70% showed improvement in teamwork, communication, leadership, and/or public speaking life skills.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Building REAL (Rural Entrepreneurship through Action Learning) opportunities K-12 in Vermont -- There is a lack of knowledge in rural entrepreneur-ship education at University of Vermont and K-12 schools in Vermont. This project created an innovative Agriculture and Resource Entrepreneurship program at University of Vermont, with a service learning opportunity to work with K-12 schools. Selected University of Vermont Agriculture and Resource Entrepreneurship majors worked with four Vermont high school teachers and over 200 high school students. Agreements, class participation schedule, and evaluation method were established.

Impact:

Project participants responded positively to both the new Agriculture and Resource Entrepreneurship curriculum and the service-learning program. University of Vermont students and high school students showed both increased knowledge through action learning, and motivation to continue in entrepreneurship education. This program provides a potential to articulate high school curriculum into University of Vermont in the future.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

Teambuilding for at-risk youth -- Parents and communities are interested in youths succeeding in secondary schools. Among other problems, the bottom 15 percent of the class tends to drop out, and is at greater risk of spending time in the Vermont penal system. In addition to the economic burden this poses on the state, an important segment of productive citizens are lost to communities. Dropout rates correlate with crime rates in communities and create added security-related costs and a reduced sense of security for community members. A teambuilding program centered on environmental conservation education was developed for at-risk youth. Youth collaborate with adults and other students to learn about environmental issues through experiential and hand-on learning options.

Impact:
Since the program's inception, 150 at-risk youth have been served and twenty-five educators have been trained to conduct parts of the program. During educator training, 92% of participants demonstrated an increase in knowledge related to teaching life skills to youths at risk, and 88% of participants reported they intended to implement information gleaned from the experience. From surveys following educational experiences, 66% of youth participants reported skill mastery of a targeted life skill and 98% demonstrated improved academic success.

While sixty-six seventh graders were enroute to a two-day team building activity including high & low ropes courses, GPS orienteering, canoeing, and camping, one thirteen year-old student did not speak a word on the ninety-minute trip to the site. He appeared isolated as he stared at the floor or out the window. Attempts by adults to engage him resulted in one-word replies with no emotion. Another student was moved into his bus seat and again there was no emotional or verbal response. This was his second year at the school. He silently participated in the first mornings group activities with no enthusiasm as others encouraged, laughed, and challenged. He chose not to participate in any of the free choice activities including swimming. In the afternoon he climbed the high wall more quickly and with less effort than anyone else had amidst cheers and hoorahs. He began to make quiet suggestions to other struggling students. By late afternoon he joined in a leisure play with three other boys, and came running down for dinner with them later. His verbal interaction increased slowly. On the bus trip up his teachers shared that he has been quiet in class since entering middle school and that his Mom is highly concerned about his withdrawal from communicating. Since the two-day team building experience, and with the continued support of his teachers and the trail building activities, this child is connecting with his peers. Other students are also demonstrating increased ability to accept and enjoy diversity, to take responsibility for their actions, and to take on leadership roles that they perhaps would not have. Academic success will be measured at the end of three years but progress is going in a positive direction.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Babysitting safety program -- Teenagers are being hired to baby-sit without having received proper training or an understanding of safety issues associated with infant and toddler care. A Babysitting Safety Program teaches youths in grades five through eight the behaviors and skills needed to become competent babysitters, and to improve the safety of children who are being babysat. Life skills that support workforce preparation are also introduced to training participants during the five sessions required to complete the program.

Impact:
As a result of the Babysitting Safety Program, families in northern counties of Vermont now have more than 350 certified babysitters available to them. Sixty-six percent of one group (64 participants), and 55% of another group (80 participants) stated they are able to better market their skills after taking the program this past year, thereby increasing the income they can make and/or the quality of jobs they can select. Community members expended more than $500 in volunteer coordinator time to bring this year's babysitting safety program to fruition.

On December 28, a teenager was babysitting at a home in Lowell, VT when a fire was discovered in the house. The teen has been recognized for saving four children from the burning home. She was able to get all of the children from ages 7 months to 5 years from the burning home. She credits the Babysitting Safety class, co-sponsored by University of Vermont Extension and the North Country Hospital Wellness Center, for giving her the skills she needed in this emergency. One part of the course includes a visit from the local fire chief to discuss fire safety.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Key Theme: Consumer Management

Youth Financial Savvy -- Population increases and decreases come and go, and the economy cycles through periods of growth and recession, but one of the constants over nearly a half-century has been an increase in youth spending. According to market research firm Teenage Research, the 32 million teenagers (kids ages 12 to 19) in the United States spent more than $172 billion last year, for an average of nearly $104 per week. Meanwhile, over the past 10 years, our youth have represented a larger and larger slice of those who file for bankruptcy. In 1996, only 1 percent of personal bankruptcies were by those age 25 or younger. By 1998, that number had risen to almost 5 percent. In 1999, a year later, the number rose to 6.8 percent of all bankruptcy filers. This represents a 700% increase in minors filing for bankruptcy, and most of this debt is credit card debt.
To reduce costs while expanding service to our youth, University of Vermont Extension outreach utilizes technology and teach-the-teacher philosophies to increase the number of Vermont teenagers and young adults making responsible financial decisions. Target audiences included high school teachers, vocational educators, alternative educational program teachers, credit union staff, and limited resource audiences. To this end, a Youth Financial Savvy workshop was conducted over Vermont Interactive Television (VIT) at eleven locations around the state. More than forty people attended including teachers and agency personnel who work with teens and young adults on money management topics.

Impact:

After attending the VIT session on Youth Financial Savvy, 40 Vermont teachers/educators, representing 1,397 teenage students, signed up or requested the curriculum materials from the National Endowment for Financial Education. Surveys following class implementation will gauge more direct impact on students. Results from the previous year's programs show that 790 youth who completed the program showed marked improvements in their personal financial knowledge, behavior, and confidence level related to financial planning: 47% demonstrated they knew more about credit costs; 38% showed increased knowledge about investments; 37% improved skills for tracking spending; 45% began saving money, or increased the amount of money they saved; 38% felt more confident about managing their money.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Ag Business Management – Many farmers need assistance in managing money. An agricultural business management course conducted by University of Vermont Extension personnel for farmers is designed to address this need.

Impact:
People from seventy-five percent, (12 of the 16) farms who attended the Ag Biz Class in North Haverhill, NH have successfully completed the course. "I learned how to manage money." "FSA made us take this course honestly I was dreading it. But I am really glad we took it." "I took your suggestion to begin saving a little money. Each farm check that comes in, I now deposit the bulk of the check into checking- rounded to the hundreds of dollars, but the amount off from the hundreds is deposited into our farm savings account." "As a result of what I learned in this course, I have structured my payments with my main buyer so my cash flow works out. This year I get a monthly payment each month of which about 2/3 goes to paying bills and the rest I put into a savings account. The value of this course is in my peace of mind. To run a farm or business without a good handle on the finances is very stressful." "The spreadsheet we received in the course for monthly cash flows has been a big change in how we run the business."

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Key Theme: Youth Development/4-H

4-H Youth Club activities -- The University of Vermont Extension 4-H club program is an important part of the total youth development opportunity in the state. The number of youth in both urban and rural settings provides the opportunity to grow the volunteer base of 4-H, which in turn builds the youth base of the program. The beauty of 4-H is that the interests of adult volunteers can be channeled to work with a group of youth in a 4-H club. The knowledge that nearly 20% of all youth in Vermont under the age of 21 are in contact or have had contact with the justice system indicates the level of need to provide our youth with the opportunity to learn positive life skills. The volunteers within a 4-H club program structure are important mentors to our youth in developing decision-making, problem-solving and communication skills, among others. The use of animals, sewing, rocketry, dance, or other similar activities are the focus for developing life skills. 4-H club activities are experiential in nature, and designed to engage youth, since an engaged person is more receptive to learning life skills from the volunteer. Citizenship education is a major focus of 4-H activities in the State. Events include the

Citizenship Washington Focus program for 4-H teens delivered through a one-week experience in our nation's capitol, Vermont and New England Teen Congresses, and a Day at the Capitol. These events are followed up by voluntary completion of Community Service projects accomplished using the 4-H Club method. Exhibitions, Fairs, Regional and State Days and Field Days are opportunities to share 4-H Life Skills education with the community through demonstrations, exhibits and public speaking.

Impact:
During 2002, 9,163 Vermont youths enrolled in 4-H activities, the majority of these ranging from grades five through eight and residing in rural areas or towns having fewer than 10,000 people. After state and regional gatherings, where students demonstrate and exhibit their skills, 85% of 4-H youth club participants were reported to have increased knowledge and skills in public speaking or performing, and 75% of 4-H youth club participants increasingly applied 4-H defined life skills during the year. Of the 80 4-H youth participating in Foods Day, 80% demonstrated increased knowledge of healthy eating habits and cooking safety procedures. Vermont counties were represented by 38 youth participants at Citizen Washington Focus, 84 youths at Teen Congress, 399 youths at 4-H State Day, and 55 youths at Day at the Capitol. More than 100 Community Involvement projects were completed by 85% of 4-H members attending government-related events, and forty percent of these projects focused on environmental issues. Fifty percent of participants at Day at the Capitol demonstrated they adopted citizenship practices at the local level. More than 31,000 volunteer hours by 1,273 adult volunteers and 131 youth volunteers helped bring about student participation and success. Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

4-H/Youth Gardening Program -- The 4-H/Youth Gardening Program addresses the needs of Vermont youth by assisting youth in economically depressed regions of the state to obtain gardening and life skills. Residents, parents, and youth are involved in the program to teach and learn life skills that promote a healthy lifestyle and aid in sustaining agricultural (gardening) practices. 4-H educators and volunteer leaders carry out training. The 4-H/Youth Gardening Program provides garden seeds, plants, workshops, and garden visits by local Master Gardeners to participating youth. Parents and participants were asked to evaluate the program.

Impact:
Parents of the 45 participants in this past year's 4-H/Youth Gardening Program reported gains and/or improvements for 27 of the 35 life skills in the Iowa Life Skills Model. One youth gardener in the 4-H/Youth Gardening Program decided to plant a row of lettuce to donate to a local food shelf. After hearing how appreciative the recipients were of only the lettuce, this 4-H member chose to donate the rest of his produce to the food shelf once it had ripened.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Vermont Farm Youth Corps -- Agriculture is a very important part of Vermont's economy and landscape. To perpetuate the future stewardship of Vermont's agricultural heritage the present stewards require opportunities to pass on their knowledge, and Vermont's youth need the training to learn from experienced elders. Vermont Farm Youth Corps (VFYC) is a program designed to increase agricultural work skills for young Vermonters (ages 16 to 21). Participants participate in an eight-week hands-on learning/working experience within the agricultural

community. Focusing on intergenerational learning between current agricultural professionals and their enthusiastic VFYC apprentices, VFYC staff provides the link and necessary resources for both parties.

Impact:
Of the 55 Vermonters completing the program this year, 21 graduates were asked by their employers to continue employment part time while they completed educational goals. Five field educators worked with teachers and school staff to help transition VFYC participants back into schools, and provided teaching staff with detailed records of accomplishments. All 55 participants gained insight and knowledge of issues facing Vermont agriculture.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Key Theme: Children, Youth and Families at Risk (CYFAR) Program

Children, Youth and Families at Risk (CYFAR) Program -- Through an annual Congressional appropriation for the National Children, Youth and Families at Risk CYFAR) Program, CSREES allocates funding to Land Grant University Extension Services for community-based programs for at-risk children and their families. The CSREES funded Children, Youth and Families at Risk (CYFAR) Program works to meet critical needs of children and families. The program is based on the human ecological principle of working across the lifespan in the context of the family and community, and supports comprehensive, intensive, community-based programs developed with active citizen participation in all phases. CYFAR promotes building resiliency and protective factors in youth, families and communities. This year, the focus of effort was on designing and implementing life skills and competency building program evaluations.

ECC 4-H Educators will attend monthly 4-H Team meetings in a concerted effort to regularly engage ECC staff in conversation with the 4-H Club program staff in order to encourage interchange of ideas and integration of programming. ECC Project Director has provided training for the Targeting Life Skills Model, Logic Model for Outcome based programming, Ages and Stages of youth development, and introduction of the Life Skills Evaluation System from Washington State University at a recent 4-H Team meeting. This evaluation system will be the first step to incorporating a reliable and valid assessment instrument into our life skills education.

Impact:

Each of the target communities is addressing the formation of the Steering Committee with a different audience. Johnson is working closely with the local school and putting together a MOU to define their collaborative agreement. Brandon is working closely with the town manager that is eager to bring quality youth programming to the community. They are at the interview stage to hire project staff and will be interviewing an applicant in Alaska affiliated with a CYFAR project there. Newport is working with the District Partnership (Agency of Human Services affiliates and all Department of Education affiliates) in the area. Each process, though different, is appropriate for the community needs.

Smith Lever funds were used in part or in full to develop this project for the State of Vermont.

Key Theme: Enhancing Customer Service/Satisfaction

Impact of electronic financial services technology: Adoption of innovation and consumer problems -- Over 6,000 depository institutions issue VISA and MasterCard credit cards and independently set the terms and conditions of their plans while another 10,000 institutions act as agents for card-issuing institutions. The probability that a consumer will have a problem with credit cards is high. This study examined problem resolution for consumers who have experienced a problem with a credit card. Using data from the Survey of Consumers, researchers found that among all households with a problem, nearly two-thirds were able to resolve their problem, while over half exited. Holding all else constant, consumers who were likely to resolve their problem were only half as likely to exit.

Impact:
Results will help institutions recognize that companies must continue to offer superb customer service if they are to retain customers.

Hatch Act funds were used in part or in full to develop this project for the State of Vermont.

University of Vermont Extension and Agricultural Experiment Station Total Resources for FY 2002

FY2002 Human and Fiscal Resources

Human Resources FY 2002	Extension		Agricultural Experiment Station		TOTAL
National Goal Area	Professional FTEs	Para-professional FTEs	Professional FTEs (faculty)	Para-professional FTEs (tech's)	
1 - Competitive Agriculture	12.09	1.73	7.4	5.5	26.72
2 - Food Safety	3.25	1.06	1.4	0.7	6.41
3 - Human Nutrition	3.2	0	2.9	2.4	8.5
4 - Ag and Natural Resources Harmony	4.24	0	5.4	6.8	16.44
5 - Family and Community Resources	12.14	7.5	0.8	0.3	20.74
TOTAL	34.92	10.29	17.9	15.7	78.81

Expenditures for FY2000	Extension		Agricultural Experiment Station		TOTAL
National Goal Area	Federal	State	Federal	State	
1 - Competitive Agriculture	650,320	1,101,407	708,240	871,356	3,331,323
2 - Food Safety	205,097	347,360	61,606	138,226	752,289
3 - Human Nutrition	155,681	263,667	172,638	365,174	957,160
4 - Ag and Natural Resources Harmony	246,367	417,256	401,683	523,044	1,588,350
5 - Family and Community Resources	784,582	1,328,795	42,179	128,002	2,283,558
TOTAL	2,042,047	3,458,485	1,386,346	2,025,802	8,912,680

B. University of Vermont Extension and Agricultural Experiment Station Stakeholders

During FY2002, processes and groups used to assess stakeholder input for University of Vermont Extension and the Vermont Agricultural Experiment Station (Vermont Agricultural Experiment Station) remained much the same as in previous years. The "Research-Extension-Vermonter" connection is a continuous cycle. Vermont Agricultural Experiment Station has the unique responsibility to serve the agricultural and related needs of Vermont through research. University of Vermont Extension provides access to technology, educational programs and practical information concerning Vermont communities, families and homes, farms, businesses, and the natural environment. Put simply, Vermont Agricultural Experiment Station researchers study problems identified by people of the state, while University of Vermont Extension specialists share the results of this and other research with Vermonters, helping them to meet their needs--and bringing back to the University the real-life questions and concerns needing further research. University of Vermont Extension and Vermont Agricultural Experiment Station rely on the input and advice from many Vermonters to help determine the relevance, usefulness, and quality of programs and research projects. This advice comes from a variety of sources and in a variety of forms.

Working with the College of Agriculture and Life Sciences, Center for Rural Studies, Vermont Agricultural Experiment Station and University of Vermont Extension seek input from an Annual Vermonter Opinion Poll, which has been conducting random-based, phone-interview polls of registered voters in the State of Vermont since 1990. The 2002 poll, with 734 respondents, identified topics of interest for research for Vermonters, then focused on issues found to have been important to Vermonters in previous years – sprawl development and land use, genetically modified foods, Vermont produced agricultural products, computer use in homes and Internet commerce. The sample is made more representative by using 2000 U.S. Census data to weight sample cases over the entire population. Results have a margin of error plus or minus five percentage points. Although not all information has been made available yet, several important themes have emerged.

The three most important issues for Vermonters, based on the 2002 Vermonter Poll, were jobs and the economy, education, and land use and sprawl. The fourth greatest concern noted was the "environment," which had not been cited as one of the top five in the previous year's poll. Survey responses are used to guide planning in subsequent years. An important series of questions yielded useful results for directing research foci over the next years. Respondents were asked to identify what issues come to mind with regard to research, when presented with each of the five National Goal Area statements. Open-ended responses were aggregated into categories within each National Goal Area. At least five percent of respondents reported interest in issues categorized below for each National Goal Area.

National Goal Area 1: Issues that Vermonters view as being related to an agricultural system that is competitive in the global economy (n = 472) – support of small sustainable family farms (22.9%), dairy industry (12.5%), government policies toward farmers (10.2%), and trade issues (9.5%).

National Goal Area 2: Issues that Vermonters view as being related to a safe food system (n = 535) – effects of pesticide and chemical use on foods (15.1%), "GMO" and rBST use in foods

(12.7%), organic foods (10.7%), and government regulations and inspections to ensure safe foods (9.3%).

National Goal Area 3: Issues that Vermonters view as being related to a healthy, well-nourished population (n = 556) – nutrition education concerning a balanced diet (20%), equal access to food (13.7%), health insurance and care (9.7%), government assistance, such as food stamps (7.0%), poverty and hunger issues (5.2%), and weight control (5.2%).

National Goal Area 4: Issues that Vermonters view as being related to an agricultural system that protects the environment (n = 424) – issues related to reducing the negative impacts of fertilizers, pesticides, and chemicals on the environment (12.5%), issues related to the effects of organic food production and consumption on the environment (9.4%), government regulations (8.4%), water quality (8.3%), and farming issues related to the environment (7.5%).

National Goal Area 5: Issues that Vermonters view as being related to an enhanced economic opportunity and quality of life (n = 458) – education and training needs (22.7%), employment assistance (15.5%), and wage related issues (increasing minimum wage/living wage, 7.2%).

Programming has focused educational programs on economic interests for rural and underrepresented communities in response to poll figures. There may be future shifts of effort to accommodate Vermonters' interests in the five national goal areas.

The Vermont Agricultural Experiment Station is additionally advised through the Board of Advisors for the College of Agriculture and Life Sciences. This Board consists of leaders in agriculture, small business, sustainable agriculture, food and nutrition, biology and life sciences, rural community development, higher education, and public affairs. Board members are appointed by the Dean of the College of Agriculture and Life Sciences, who is also the director of the Vermont Agricultural Experiment Station, and consist of a Board chair and two standing committees -- executive and nomination. Terms for members are for three years, with members allowed to serve up to two consecutive terms. The Board meets two times each year to advise the College of Agriculture and Life Sciences and Vermont Agricultural Experiment Station, and other times at the discretion of the president and provost of the University of Vermont. In addition to assisting Vermont Agricultural Experiment Station in identifying trends, issues and new developments in each of the CSREES-defined national goal areas, the Board advises the group on formulating strategies, setting priorities, developing resources, reviewing program plans, and cultivating relationships to bring about learning experiences, field-based research, and employment opportunities for students.

Individuals serving on University of Vermont Extension advisory boards and councils contribute to the evaluation of existing programs and the planning of new programs. University of Vermont Extension meets with a State Advisory Board four times annually, and receives advice from regional and program-oriented advisory committees on similarly periodic bases. The common thread for all advisors serving on boards is a commitment to University of Vermont and its high quality research and Extension education. Leaders from throughout the Vermont community regularly and generously offer advice and guidance to University of Vermont Extension and the Vermont Agricultural Experiment Station. Stakeholder input for University of Vermont Extension can be further explained by describing how it is obtained for program areas within each national goal area.

- **University of Vermont Extension Stakeholder Input Mechanisms for National Goal Area 1**

The most structured mechanism for receiving advisory support toward programs focusing on agricultural competitiveness is through University of Vermont Extension Advisory Councils. Advisory Councils are structured to solicit input from a broad array of interest groups. Agricultural representation includes conventional farmers, organic farmers, agribusiness professionals, and representatives of organizations and agencies. Each of the four regions has Advisory Councils with agricultural representation. The Councils meet between four and six times per year and provide input to Regional Chairs, faculty and staff. Similarly, the State Advisory Council provides input on statewide issues. Specific program areas receive input from additional advisory boards. The Agricultural Business Management program has an advisory group that is composed of a banker, dairy producers, non-livestock producers, FSA employees, and representatives of industry. This board provides input relative to the structure and content of Agricultural Business Management workshops conducted throughout the state. Similarly, formal input is solicited on an annual basis from the Internal Revenue Service, the Vermont Tax Commissioner, and private tax accountants relative to the design of curricula for tax management workshops. The Rural and Farm Family Vocational Rehabilitation Program has active citizen advisory groups in the Northeast and Northwest Regions. These groups provide valuable input and provide a support network for disabled farmers and rural residents. Vocational Counselors receive input on program delivery and strive to address the needs of clientele.

Individual faculty and staff targeting programs toward agricultural enterprises work closely with commodity organizations on both a formal and informal basis. Extension professionals serve on committees in many of these organizations and frequently act as technical advisors. Input flows from commodity groups on both a formal and informal basis. Because of the size of the state, there is a general awareness among commodity organization about effective input channels. "Discussion Groups" are conducted throughout the state on various commodity-based topics. These groups meet on a regular schedule to discuss issues affecting their sectors. University of Vermont Extension faculty serve as facilitators for these groups.

Working closely with University of Vermont's Proctor Maple Research Center, Extension and Vermont Agricultural Experiment Station faculty and staff respond to the needs of Vermont's twelve county sugar maple associations and sugar makers in general. University of Vermont Extension is the only comprehensive educational and informational resource available for both commercial and small, family-based maple sugar operations. Vermont sugar makers have recommended and guided the design of an educational series on small-scale maple sugaring and have contributed critical financial resources to support the work of University of Vermont's Entomology Laboratory.

Other Vermont agencies having an interest in the agricultural sector are also consulted. A close working relationship exists between Extension and the Vermont Department of Agriculture. Many cooperative programs exist, and ideas are routinely exchanged via individual visits, telephone conversations and electronic mail. Extension professionals also readily interact with

USDA FSA and NRCS personnel on both formal and informal bases. Similarly, Extension professionals maintain working relationships with personnel in local conservation districts.

Because of the small size and populations of many New England states, multi-state interaction is a necessity for effective programming. Expertise is readily exchanged across state lines. Formal interaction is facilitated through regular meetings among agricultural program leaders and Vermont program area representatives. In 2001, an agricultural directory was developed listing expertise of Extension professionals in Vermont, New Hampshire and Maine. Faculty and staff participate in numerous multi-state programs and maintain functional informal relationships with counterparts in other states.

- **University of Vermont Extension Stakeholder Input Mechanisms for National Goal Area 2 and 3**

Many stakeholder groups provided input about programming related to the goals of providing safe and secure food sources, and healthy and well-nourished populations. They include University of Vermont faculty from the department of Nutrition and Food Science, Northeast Center for Food Entrepreneurship, University of Vermont Sustainable Agriculture Center, University of Vermont Extension Nutrition, Food Safety and Health Curriculum Team Advisory Group, Vermont Food Safety Network, Vermont Food Bank, Northeast Organic Farmers Association, Education and Training Council, Vermont Department of Health, Vermont Department of Education, Food and Markets, Vermont Department of Agriculture, Vermont Department of Aging and Disabilities, Southwest Council on Aging, Vermont Restaurant Assoc., Vermont Manufacturing Extension Center, AARP, Vermont Campaign to End Childhood Hunger, Serve New England, Vermont Department of Employment and Training, Head Start, Community Action Agencies, Farmer's Market Association, Vermont Specialty Food Association, Vermont Fruit and Berry Association, Conference on Food Protection, childcare providers, food service managers and food producers.

To maintain an engaged stakeholder population University of Vermont Extension faculty initiate and sustain regular communications, and involve stakeholders in programming and impact analysis. University of Vermont Extension personnel use both formal and informal approaches to engage stakeholders. The formal approach includes group process, focus group interviews, and retreats. For example, to create our mission statement, goals and objectives the following "group process" steps were taken with the advisory group over a period of five years. In 1995, a nomination and invitation process formed an advisory group representative of our consumers and collaborators. The group attended an initial planning meeting on April 3, 1995. Members were mailed a resource packet that included a survey asking for input about their special interests related to nutrition, food safety, food security, and health and what issues they hoped to see at the forefront of research and educational programs. Using the results of the survey as a starting point, a nominal group process was used to determine what the program foci would be. Three priority areas were selected as our target for programming: Food Safety, Food Security and Practical Education Nutrition and Food Preparation information. Three sub committees made up of faculty and advisory members were formed to develop specific program objectives, action plans and evaluation strategies. In 1996 the advisory group and University of Vermont Extension personnel met again to review the results of the sub-committees work and to finalize mission statement, goals and objectives for the 1996-99 Plan of Work. University of Vermont Extension members met with their advisory sub-groups each year since then, for a program review and

impact analysis. Recommendations were recorded and put forth for the following years planning. In February 1999, the advisory group met with faculty and staff to review accomplishments for the program period of 1996-99 and to take part in a group process to formulate goals and objectives for FY2000 to 2004. A decision was made to keep on course, maintaining our mission statement, goals and objectives. It was also decided to evaluate the plan on an annual basis to impact making changes where necessary. The advisory group and team met in September of 2000 to review past performance and current goals and objectives. It was determined at that time to allocate resources to diabetes education and to enhance our efforts to reach Vermont's senior citizens with nutrition and food safety information. Food stamp monies will help to offset the costs of these new initiatives.

With regard to food safety issues, University of Vermont Extension food safety specialists have worked with another formal advisory group, the Vermont Food Safety Network. The network has a membership of over sixty people representing educators, food producers, regulators, and others who are interested in promoting food safety in Vermont. The Vermont Food Safety Network has, through group process, prioritized food safety issues for the state. Top priorities included: education and training; the need for certification standards regulation, and statewide strategies for the food industry; and leadership in food safety for all groups and parties.

Informal contact with stakeholders regarding food safety, food security, and nutrition programs take place daily as University of Vermont Extension personnel work with members of their communities to plan and implement their programs. Results of a survey of local food shelves and community kitchens conducted by the Vermont Food bank has been used by University of Vermont Extension to determine what types of nutrition and food safety workshops should be conducted to help Vermonters with limited resources. It is University of Vermont Extension's goal to continue to address issues specific to Vermont, enhancing the quality and impact of these program efforts by engaging in collaborations with land grant institutions across the nation, with the research and teaching faculty at University of Vermont and with other Vermont agencies and institutions.

- **University of Vermont Extension Stakeholder Input Mechanisms for National Goal Area 4**

Four major groups are consulted to obtain input on programs designed to increase harmony between agriculture and the environment: landowners in control of natural resources management; users of Vermont's natural resources; organizations interested in natural resource management; and individuals interested in natural resources management. Information on programming to meet the needs of these stakeholders comes from a variety of means. These include using surveys, personal discussions, memberships on boards and committees, and including a wide range of representatives on Extension boards and councils.

Input that was received included the need to address the economic basis of natural resources management within Vermont and balance this use against the desire to maintain a sustainable resource that meets the needs of a diverse population. There is a desire among youths to know more about their role in maintaining a sustainable environment and community while developing a sense of place.

- **University of Vermont Extension Stakeholder Input Mechanisms for National Goal Area 5**

Community and Economic Development initiatives benefit from the input of a 10 member advisory council representing a variety of agencies and organizations as well as community volunteers. These people have varied backgrounds and bring diverse perspectives to discussions and decision-making. The advisory council meets twice a year, receives informational mailings & telephone calls, and additionally, using e-mail technology, participates on a Community and Economic Development listserv. Annually, members provide advice related to programs during our planning period and help to set priorities for the team. The most recent advisors' assessment was in April 2002, when they ranked each of the potential programs based on their experience and sense of community need.

- **University of Vermont Extension and Vermont Agricultural Experiment Station Stakeholder Input on Developing Resource-Effective Programs**

Extension advisors and other Vermonters help guide Extension programs in agriculture, natural resources and environmental management, nutrition, food safety, and health, and family and community resources and economic development. The following are just some examples of programs developed in consultation with a network of University of Vermont Extension faculty and staff and advisors--including clients, commodity groups, and other Extension, Experiment Station, or University colleagues--to help determine the best use of limited resources, the most effective way to deliver a program, and opportunities for creating partnerships.

Working closely with University of Vermont's Proctor Maple Research Center, Extension and Vermont Agricultural Experiment Station faculty and staff respond to the needs of Vermont's twelve county sugar maple associations and sugar makers in general. University of Vermont Extension is the only comprehensive educational and informational resource available for both commercial and small, family-based maple sugar operations. Vermont sugar makers have recommended and guided the design of an educational series on small-scale maple sugaring and have contributed critical financial resources to support the work of University of Vermont's Entomology Laboratory.

University of Vermont Extension is an important leader among the vast number of individuals and organizations throughout the state working to support the positive development of Vermont youth. More than 1,500 volunteers invest numerous hours and incredible talent to 4-H camps and clubs and other youth-related program efforts.

C. Program Review Process

Extension:
A comprehensive system of state, regional, and curriculum advisors has contributed greatly to the ongoing, informal review of University of Vermont Extension programming. In response to AREERA, a more formal merit review of outreach activities was conducted in May 1999. Two reviewers from each of University of Vermont Extension's four curriculum/program teams' advisory groups were selected to systematically review all proposed curricula. Reviewers were asked to rate each curriculum plan according to the following criteria:

• Impact – programs have the potential to produce a measurable, positive impact on Vermonters
• Resource availability/accessibility—the plan identifies the necessary resources (people, dollars, curricula) to implement programs successfully.
• Reaching diverse audiences—potential for programs to meet the needs of diverse, underserved audiences.
• Customer demand—programs are linked to clearly articulated customer needs.
• Collaboration—potential exists for collaboration between Extension and research, with other University of Vermont Departments, or with other institutions.
• Innovation—programs are unique, are not being done, or are not done well by others.

Members of the 1999 Review Team for the Plan of Work 2000-2004 included:

• Liz Slayton, Vermont Senator Patrick Leahy's Office
• Sue Clark, Vermont Department of Education
• Phil Benedict, Vermont Department of Agriculture, Food & Markets
• Enid Wonnacott, Northeast Organic Farmers Association
• Ed Larson, Vermont Wood Products Industry
• Ann Street, Vermont Department of Education—Family & Consumer Sciences/Human Services Division
• Bill Jewell, Landscape Architect, Vermont Act 250 Coordinator
• Claire Ayer, Vermont Association of Conservation Districts

Results of the merit review process are shared with members of the University of Vermont Extension program management team that includes the chairs of on campus and regional units and the curriculum/program teams.

Extension representatives continue to meet with a State Advisory Council four times per year to evaluate the merit of past, current and future programming foci. Current members of the State Advisory Board represent nine different counties in Vermont:

Anne Allen
Ray Allen
Michael Farmer
Preston Bristow
Bill Jewell
Edward Larson
Liz Slayton
Betty Rambur
John Titchner
Jolinda LeClair
Johanna Laggis

Agricultural Experiment Station:
VT-AES process review occurs in the context of events described in the Stakeholder Input section of this report – Vermonter Poll data and data collected by faculty is augmented by data gathered from meetings held with individuals serving on UVM Extension advisory boards and councils to evaluate existing programs and plan new programs. No major changes have been made to VT-AES review processes since 1999.

D. Evaluation of the Success of Multi and Joint Activities

- **Multi-Institutional and Interdisciplinary Activities**

Many University of Vermont faculty and staff are increasing their collaborative efforts with researchers and other colleagues from other states and institutions.

An excellent example of University of Vermont researchers working with other states is the bovine mastitis project. Vermont Agricultural Experiment Station researchers are active participants in a study of mastitis-resistant animals involving colleagues from 13 states as well as Canada and England. This work has led to scientific breakthroughs that could significantly improve animal health and welfare and potentially save the dairy industry millions of dollars. Research efforts include the development of new vaccines to combat mastitis using novel DNA-based technology. A mastitis-resistant mouse has been developed, and results of this work are being transferred to improve mastitis resistance in dairy cows. The Vermont Initiative on Animal Production and Food Safety Education has reached livestock producers in Vermont and New Hampshire to increase their knowledge and understanding of animal health and food safety issues.

University of Vermont Extension agricultural specialists are also working closely with the University of New Hampshire to improve water quality in the Connecticut River Valley. The Integrated Crop Management project has led to strong commitment on the part of ten participating communities along either side of the river (and therefore in different states). By-laws of the newly formed bi-state organization have been developed and implemented. Impacts on policies, programs, or behaviors affecting the Connecticut River Valley watershed have yet to be determined. Additional efforts in the area of water quality improvement include a nutrient management planning and education program targeting dairy farmers in Vermont, New York, Pennsylvania, and New Hampshire. Colleagues have joined forces to advance research, which has led to recommendations for farmers about the most cost effective ways to reduce phosphorus loading in waterways leading from their fields. Development, with University of Pennsylvania, of updated versions of CropMD software offer farmers a customized method for determining how to effectively and economically manage their lands to control phosphorus runoff. Reducing the phosphorus content in feed, creating buffers, and receiving advice from consultants has provided dairy farmers with cost-effective mechanisms for maintaining water quality as herd size grows. The Watershed Alliance project focuses on education and outreach related to watershed and coastal water quality around the Lake Champlain Basin. The project is supported by USDA, University of Vermont School of Natural Resources, and Lake Champlain Sea Grant dollars. While University of Vermont Extension is focused on watershed management and stewardship, colleagues at State University of New York -- Plattsburg offer expertise in fisheries for the bi-state Lake Champlain Sea Grant program. The efforts have created youth-led actions resulting in safer water for communities.

Vegetable and berry outreach efforts have involved multiple states and institutions to cover the New England region. The 2001 New England Vegetable and Berry Conference and Trade Show held in Sturbridge, MA was planned by a steering committee from six states, comprised of extension, research, industry personnel and farmers. Of the 167 attendees of the 2001 New England Vegetable and Berry Conference and Trade Show completing evaluations, 67% said

that attending the conference would enhance the profitability of their farm, 75% said that their management of soil would improve, and 86% said that their management of pests would improve. According to evaluations, 84% of participants found out about a new source of information, and 73% planned to adopt a new practice the following year as a result of attending the conference.

University of Vermont Apple Team researchers and Extension faculty are continuing long-term collaborations with Cornell University to develop and field test new apple cultivars that will eventually improve the hardiness and quality of Vermont's apple crop. Two cultivars have been developed that have been identified as appropriate for Vermont climate and orchard conditions. Theses cultivars have been planted commercially throughout the state, although data about impact on apple growing profits related to the use of these cultivars remains outstanding. Additional research for this project has yielded data suggesting a dwarf series rootstock performs more efficiently than other series for apple tree growth and production.

The establishment of the joint University of Vermont—Cornell University Northeast Center for Food Entrepreneurship (NECFE) through the successful proposal award of $3.8 million by USDA Fund for Rural America, has produced a synergy among researchers and outreach personnel for food manufacturing start-up and small businesses. NECFE has assisted in analyzing more than 400 products for safety and marketing feasibility. The center has also helped entrepreneurs to expand sales beyond state lines – to other regions, and internationally. NECFE is a growing organization, creating a large, northeast cooperative for food manufacturing entrepreneurs.

University of Vermont Extension food safety specialists are working with faculty from New England, New York, Wisconsin, and West Virginia on food safety programs that emphasize reducing microbial contamination on produce. Food safety curricula have been developed, used to train instructors, and disseminated throughout the country, based on the combined efforts of University of Vermont Extension, University of Rhode Island, University of Connecticut, and the University of New Hampshire. Food certification of school food service workers translates into safer school food for our children, who are most at risk of food-borne illnesses. Vermont has certified 23 food service workers, making them eligible for promotion and pay raises, as well.

In cooperation with colleagues throughout New England, University of Vermont research and Extension specialists continue to deliver cutting edge research and educational information to aid greenhouse growers in adopting safer integrated pest management strategies. This past year New England growers were educated on thrips management in greenhouses, spray nozzle effects on pest management, and other methods to reduce use of pesticides to save money and maintain stronger, healthier plants.

The Women’s Agricultural Network (WagN) has expanded beyond Vermont borders into New Hampshire and Maine, and now 15% of its membership resides out of state. Now the 1229 women farmers in these three states receive educational and technical assistance as the embark upon new or expanding agricultural enterprises. Efforts have led to over 200 women agriculturalists developing business plans and marketing schemes to assist their businesses.

- **Multi-State Activities**

As part of the national land grant system, University of Vermont Extension and Agricultural Experiment Station are involved in a variety of multi-state outreach and research activities that address the five national goal areas.

The establishment of the joint University of Vermont—Cornell University Northeast Center for Food Entrepreneurship (NECFE) through the successful proposal award of $3.8 million by USDA Fund for Rural America, has produced a synergy among researchers and outreach personnel for food manufacturing start-up and small businesses in northeastern states from Pennsylvania to Maine. NECFE has assisted in analyzing more than 400 products for safety and marketing feasibility. The center provided direct assistance or training to more than 1,900 people in food safety, food processing, and business development and marketing, complemented by appropriate referrals to existing local service providers. Among other outcomes, 85% of clients agreed that NECFE services met their expectations and 87% agreed that NECFE services provided the information and assistance that they needed. The center has also helped entrepreneurs to expand sales beyond state lines – to other regions, and internationally. NECFE is a growing organization, creating a large, northeast cooperative for food manufacturing entrepreneurs.

University of Vermont Extension food safety specialists are working with faculty from New England, New York, Wisconsin, and West Virginia on food safety programs that emphasize reducing microbial contamination on produce. Food safety curricula have been developed, used to train instructors, and disseminated throughout the country, based on the combined efforts of University of Vermont Extension, University of Rhode Island, University of Connecticut, and the University of New Hampshire. Food certification of school food service workers translates into safer school food for our children, who are most at risk of food-borne illnesses. Vermont has certified over 40 food service workers, making them eligible for promotion and pay raises, as well.

Greenhouse and apple growers have serious insect pest problems that limit their productivity and the value of their crops. Greenhouse growers would like to reduce their reliance on chemical insecticides. These compounds pose risks to applicators and the public. They also are losing efficacy due to insect resistance. Growers have indicated in surveys that workshops with a hands-on format are the best for transferring pest management techniques. In cooperation with other extension specialists, personnel organized workshops in Maine, Vermont and New Hampshire to address this educational need. These workshops encourage sound IPM practices that minimize chemical pesticide use, which will reduce risks to the environment and human health. University of Vermont Extension conducted three hands-on workshops to demonstrate non-chemical approaches to managing pests. Thirty-nine of 155 workshop respondents (25%) stated that they planned to adopt at least one management practice recommended in the workshop. The Integrated Crop Management project has led to strong commitment on the part of ten participating communities along either side of the Connecticut river (and therefore in different states). By-laws of the newly formed bi-state organization have been developed and implemented. Impact on policies, programs, or behaviors affecting the Connecticut River Valley watershed has yet to be determined. Additional efforts in the area of water quality improvement include a nutrient management planning and education program targeting dairy farmers in Vermont, New York, Pennsylvania, and New Hampshire. Colleagues have joined forces to

advance research, which has led to recommendations for farmers about the most cost effective ways to reduce phosphorus loading in waterways. Reducing the phosphorus content in feed, creating buffers, and receiving advice from consultants, provides dairy farmers with a cost-effective mechanism for maintaining water quality as herd size grows.

The Women's Agricultural Network (WAgN), originally funded through a USDA Technical Assistance Program, provides education and technical assistance for women farmers and introduces them to the services and programs of the USDA. One objective of the program is to develop federal, state and local partners to provide women with a comprehensive continuum of services. Since its inception in 1995, WagN has grown to include 1,040 members in Vermont, and more than 189 out-of-state members. While 635 individuals have received technical assistance and 780 have attended workshops conducted through WagN, 1,600 households actually subscribe to the WagN quarterly journal. WagN has served as a model program for newly started WagN's in Maine and New Hampshire.

Impact:
Since the program's inception in 1995, two hundred members have completed business plans, and the WagN program has expanded to two other states (Maine and New Hampshire). WagN leaders conduct a class called "Growing Places" for women who are or are considering becoming farmers. Based on follow-up surveys sent to 110 class attendees between six and eighteen months after class completion (44% response rate), 77% of respondents reported they increased their awareness about whether agriculture was the right field for them, and 85% increased familiarity with agencies and organization having useful information available to them for expanding or developing a farm business. According to respondents, participants used skills gained from the class to accomplish the following tasks:

- 46% developed comprehensive goals incorporating farm businesses with family values and lifestyle needs;
- 52% identified current resources available to them (e.g. capital, land, buildings, people, markets) and evaluated how these could be used more efficiently;
- 33% analyzed or used financial tools, such as income statements and business plans, for their businesses; and
- 31% developed marketing plans for their farm businesses.

Since completing Growing Places, one member opened an herbal gardening business and provided leadership to form the Vermont Herb Growers Association. Another member opened a business growing custom-started plants for gardeners and landscapers, and spearheaded an effort to plant over 5,000 daffodils as a living memorial to the victims of the September 11 attacks.

- **Integrated Activities**

An effective method of integrating research and Extension activities at the University of Vermont is through the split appointment of faculty. At present, there are faculty with split appointments in the following departments: Animal Sciences; Community Development & Applied Economics; Plant & Soil Science; and Nutrition & Food Science. In addition to teaching and research, faculty members are assigned to Extension curriculum/program teams and play active roles in developing and implementing outreach programs.

In the area of agriculture, Vermont has developed an integrated orchard management approach in which horticultural and pest management aspects have been interwoven in Extension and research activities. The University of Vermont Apple Program emphasizes a team approach. The team includes a pomologist, an IPM specialist, qualified technical personnel, and graduate and undergraduate students. The program features one-on-one interactions with apple growers, orchard demonstrations, meetings, workshops, publications, active research in commercial orchards, and development of Internet web sites for education and information delivery. The University of Vermont Apple Team provides the scientific and technical expertise necessary to help apple growers remain competitive in local, national and international markets while maintaining a sustainable agricultural system.

To encourage greater collaboration and integration between University of Vermont research and Extension faculty, a pool of targeted funds has been developed to support a competitive grant proposal process—The Vermont Integrated Research and Extension Award (VIRECA). Research proposals are merit and peer reviewed by a panel consisting of research and Extension faculty as well as stakeholders representing research and Extension constituencies. Eligible research proposals must be clearly linked to at least one the five national goal areas and priority areas identified by our advisors and stakeholders. These priorities include:

- Food Safety
- Food Security--increasing local consumption of Vermont grown foods
- Rural Communities--the Working Landscape and Workforce Development
- Water Quality--reducing non-point source pollution, alternative nutrient management and feeding management strategies

Advisors helped to review proposals and the program funded two three-year projects in FY2000 that will be completed in 2003. One project is dedicated to the examination of the cold-hardiness of the western flower thrips, a common greenhouse pest. The research has gleaned useful information regarding the cold-hardiness of the western flower thrips, but outreach efforts have yet to take place. Initial results would indicate that exposure of females to sub-lethal temperatures substantially reduces female longevity and fecundity. Outreach activities have included workshops in Maine, New Hampshire and Vermont that attracted over 120 growers to learn about biocontrols for insect pests and diseases. The second project explores the use of touch-screen computer technology in the delivery of health and nutrition information to senior citizens. Similarly, development of the instrument and information has been completed, and pilot tests have shown the potential effectiveness of having the screens in doctor's offices and nursing homes. Three-month follow-up evaluations are currently being administered and 12-month evaluations are planned. Outreach activities at this point have been focused on the 25 senior citizens that volunteered at two senior centers. They and six trained mentors were then introduced to a range of nutrition information to assist them during the evaluation of the effectiveness of the technology in supporting improved dietary habits.

A second round of three-year awards, including more strictly defined guidelines, offered no new award in 2001, due to the quality of proposals received. Although quality research and outreach efforts were described in many entries, the committee is determined to ensure collaboration is clearly defined. In 2002, a pre-proposal review process increased the quality of integration described in the proposals, and funds were awarded to two projects. One project focused on "Strengthening and Expanding Community Development Through Farmers' Markets" and the

other on the “Evaluation and Implementation of a Phosphorous Index to Assess P Runoff Potential from Agricultural Fields in Vermont.”

The first project builds on a variety of community development projects already underway and will investigate strategies that might expand the community development benefits of farmers’ markets. The project is focusing on expanding and evaluating how education and direct marketing strategies for farmers affects the incomes of the farmers participating. It is also promoting and measuring the impact of the Farm to Family food coupon program on food security of low-income families. The second project focuses on refining a useable measure for farmers to use in determining the potential for phosphorous runoff from individual fields and thereby provide farmers the flexibility to modify management practices related to manure and crop management on their fields. The use of this measure would identify the problem areas on a farm and allow the farmer to focus remedial efforts on prioritized fields.